DOCUMENT RESUME

ED 172 443 EA 011 883

AUTHOR Choy, Susan P.
TITLE Organizational Domain Changes in Response to Budget Reductions: New York City High Schools and the Fiscal Crisis.
INSTITUTION New York Univ., N.Y.
SPONS AGENCY National Inst. of Education (DHEW), Washington, D.C.
PUB DATE Apr 79
GRANT NIE-G-78-0041
NOTE 239p.

EDRS PRICE MF01/PC10 Plus Postage.
DESCRIPTORS Class Size; Comparative Analysis; Educational Administration; *Financial Problems; Instructional Programs; Multiple Regression Analysis; *Organizational Change; *Resource Allocations; *Retrenchment; Senior High Schools
IDENTIFIERS *New York City Board of Education

ABSTRACT

The aim of this research was to examine the response of large public organizations to financial resource reduction not accompanied by decline in the demand for services. The focus was 94 New York City public high schools that received substantial budget cuts in 1975-76 and 1976-77. Effects on mix of services and class structures were studied. All the data used in the study came from two reports published by the New York City Board of Education. Although there was wide variation among the schools, the net effect of the two cuts was proportionately greater cuts in administration and support than in instruction. Also in response to each budget cut, average class size was increased and the number of subjects taken by the pupils decreased. Regression analysis was used to examine the causes of variation in response among schools. The major conclusions were that responses to budget cuts will vary, depending on such factors as the characteristics of the organization and its clients. Results also suggest that methods of resource allocation designed for periods of stable or increasing resources may be inadequate during decline. (Author/JM)

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ORGANIZATIONAL DOMAIN CHANGES IN RESPONSE TO BUDGET REDUCTIONS: NEW YORK CITY HIGH SCHOOLS AND THE FISCAL CRISIS

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APRIL 1979

EA 011 883

Prepared for the National Institute of Education, Department of Health, Education, and Welfare under Grant G–78–0041 to Prof. Dennis C. Smith. The opinions expressed in this report do not necessarily reflect the position or policy of the National Institute of Education, and no official endorsement should be inferred.

ORGANIZATIONAL DOMAIN CHANGES IN RESPONSE TO BUDGET REDUCTIONS: NEW YORK CITY HIGH SCHOOLS AND THE FISCAL CRISIS

Abstract

The aim of the research was to examine the response of large, public organizations to financial resource reduction not accompanied by decline in the demand for services. The focus was ninety-four of the New York City's public high schools, which received two substantial budget cuts (proportionately the same in all the schools) for 1975-76 and 1976-77. The resulting changes in certain aspects of their organizational domains were studied--the mix of services and the class structure.

Drawing on previous research on schools as complex organizations, organizational change, and behavior in situations of stress, a case was made for predicting no change in the mix of services or class structure and a case for predicting change.

Change in the mix of services followed the first budget cut. Instruction and administration and support were both cut, but proportionately greater cuts were made in administration and support. Both were reduced again after the second budget cut, but no further significant change in the mix of services occurred. The net effect of the two cuts was proportionately greater cuts in administration and support than in instruction. There was wide variation among the schools. In both years there were schools where instruction was cut less than administration and support, schools where administration and support was cut less than instruction, and schools where both were cut equally.

Class structure was also changed. In response to each budget cut average class size was increased and the number of subjects taken by the pupils decreased. In both years relatively more emphasis was placed on increasing class size than on decreasing the number of subjects taken, but there was considerable variation among the schools. In some schools more emphasis was put on increasing class size, in others more on decreasing subjects taken, and in others, class structure did not change.

Regression analysis was used to examine the causes of the variation. The change in mix of services was significantly related to the pre-cut mix of services and type of school (academic or vocational) the first year, and to the same variables plus the stability of the pupil population and school size the second. The determinants of the change in class structure were the number of subjects taken by the pupils and the stability of the pupil population the first year, and the same variables plus pupil ability, the number of very large classes, and type of school the second.

The major conclusions were that budget reductions can lead to either change or no change in mix of services and how they are provided, depending on the circumstances, and the changes are not haphazard, but are shaped by, among other factors, the characteristics of the organization and its clients. Analysis of the implications of the changes for the high schools suggested that methods of resource allocation designed for periods of stable or increasing resources may be inadequate during decline.

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ACKNOWLEDGMENTS

The research reported here was a doctoral dissertation in public administration submitted to the Graduate School of Arts and Science, New York University. I would especially like to thank the members of my committee, Dennis C. Smith, Chairman, Robert M. Berne, and James R. Knickman. Their encouragement, thoughtful advice, and constructive criticism not only improved the quality of the research, but added to the enjoyment of doing it.

I would also like to thank Bernard R. Gifford, formerly Deputy Chancellor of the New York City Board of Education, for his support of this study and for providing access to the data needed. Others at the Board of Education who made helpful comments and assisted me in interpreting the data were Arthur Auerbach, Stanley Klein, and Milton Mellor, of the Division of High Schools.

My greatest debt is to my husband, Ron, who has been an invaluable source of advice and sharp insights. It is not an overstatement to say that without his support, encouragement, and above all, patience, this study could not have been done.

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CHAPTER 1

INTRODUCTION

Organizational Decline

Organizational decline is a problem that has recently been thrust into the mainstream of public management concerns. Over the past few years resource scarcity has caused drastic cuts to be made in the appropriations for many public organizations even though demand for their services has not diminished. This has had significant consequences for all connected with these organizations: the managers, the labor force, the clients, and the public as a whole.

The process and implications of organizational decline, however, have not been adequately studied. One reason is that instances of decline have not been frequent enough to stimulate systematic analysis of the consequences. The last four decades have been characterized by unprecedented growth in the public sector as a whole. Until recently, declining organizations have been anomalous and their problems therefore not considered relevant for most organizations.[1]

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[1] Charles H. Levine, "Organizational Decline and Cutback Management," Public Administration Review 38 (July/August 1978):316.

Decline has also been neglected out of lack of interest in a process that in the past has connoted failure. Most of the literature on the management of organizations focuses on the experiences of successful cases for the simple reason that managers are searching for paths to success.[1] Since growth and success tend to be equated, growth has received far more attention than decline.

These are no longer valid reasons for ignoring decline. Coping with reduced financial resources is a problem no longer limited to a few isolated agencies whose tasks have been completed or whose services are no longer in demand for some other reason. Budget cuts are now a potential concern of all managers of public organizations. Decline is also no longer necessarily a sign of failure on the part of administrators. Glassberg suggests that managers may now be able to enhance their reputations by smoothly implementing cutbacks as well as by presiding over growth.[2]

Studies of decline are also needed to further understanding of the process of organizational change in general. Kaufman points out that sickness and death in organizations must be studied in order to understand health.[1] Similarly, decline as well as growth and stability must be studied to understand why and how organizations change.

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[1] Herbert Kaufman, Are Government Organizations Immortal? (Washington, D.C.: The Brookings Institution, 1976), p. 77.

[2] Andrew Glassberg, "Organizational Responses to Municipal Budget Decreases," Public Administration Review 38 (July/August 1978): 329.

The purpose of this study is to contribute to understanding the process of decline and of change in general by investigating the impact of substantial budget reductions on selected organizational characteristics of large public schools in a situation where there has been no decrease in the demand for services. The focus of the research is ninety-four New York City public high schools and the budget cuts imposed on them for the 1975-76 and 1976-77 school years.

New York City High Schools and the Fiscal Crisis

The New York City Board of Education has no taxing power of its own; instead it is fiscally dependent on the city. Appropriations for public education are made through the city expense budget and then administered by the Board of Education. The financial situation of the Board of Education is therefore intimately related to the city's fiscal condition. Consequently, when New York City was close to default in early 1975, and drastic cutbacks had to be made as a step in the process of regaining financial stability, the Board of Education received large budget cuts along with other city agencies. As a result of the budget cuts, approximately 23,000 positions (26 percent of the total) were eliminated over a two year period, including over 16,000 teachers.[1]

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[1] Kaufman, p. 78.

The high schools, as a subset of New York City's nearly one thousand schools, also faced sizeable budget reductions. The budget for personal services in the regular high schools decreased by 7.5 percent as a result of the first budget cut and 7.0 percent as a result of the second. Since total enrollment and salary rates increased during this period, the real cuts were even greater, 13.8 percent and 10.0 percent (see Table 1).

The New York City high schools during the fiscal crisis provide a particularly suitable setting for investigating the impact of large budget cuts for a number of reasons:

1. A comparative study of a large number of similar organizations responding to the same stimulus is possible. The organizations being studied are all large public high schools in New York City with similar goals, using the same technology, and subject to the same legal constraints. Because of the way resources were allocated (see Appendix A)

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[1] Bernard R. Gifford, Public Education in New York City: Reflections on the Immediate Past and Some Thoughts About the Future--A Budgetary Perspective (New York: Office of the Deputy Chancellor, New York City Board of Education, 1976, p. 7.

TABLE 1

RESOURCE AVAILABILITY--ALL REGULAR HIGH SCHOOLS[a]

				PERCENT CHANGE	
	1974-1975	1975-1976	1976-1977	1974-1975 to 1975-1976	1975-1976 to 1976-1977
Total budget for PS (millions)	$312.0	$288.5	$268.3	- 7.5	- 7.0
Average teacher salary	$18,035	$18,973	$19,400	5.2	2.3
Staff units[b]	17,302	15,207	13,828	-12.1	- 9.1
October 31 register	299,788	306,226	309,362	2.1	1.0
Staff units per pupil	.058	.050	.045	-13.8	-10.0

Source: Based on New York City Board of Education, Comparative Analysis of the Organization of the High Schools for the Fall Term (issued annually), pp. 1-2, 9-10.

[a] There were 98 regular high schools (i.e., excluding independent-alternative high schools) in 1974-1975 and 99 in 1975-1976 and 1976-1977.

[b] Resources for personal services are distributed to the high schools in terms of staff units, not dollars. The total number of staff units available is the total budget divided by the average teacher salary. See Appendix A for a description of this method of resource allocation.

they all received the same proportional cut. In addition, the same data are available for all the high schools. It was therefore possible to develop measures of change that could be used for all the schools and that could be compared meaningfully from school to school.

In spite of the fact that they are all part of the same larger organization, the schools are independent enough to be treated as separate units in a comparative study. They provide services to mutually exclusive populations without interacting, and the principals had wide discretion over how to implement cutbacks.

2. The changes due to the budget cuts are readily identifiable. The size and timing of the budget cuts, the relative stability of the organizations of the schools during the pre-cut period, and the relative stability of the environment during the period when cutbacks were being made all make it possible to identify with some certainty the changes actually precipitated by the budget cuts.

The sheer magnitude of the cuts virtually assured an identifiable impact. Reductions of the size described above were too large to be dealt with by budgeting or accounting gimmicks or by marginal changes in a few programs. Consequently, the impact of the cuts was clearly visible. The fact that the budget cuts marked the reversal of a long term trend of increased resources for public schools also made the changes easy to see. They stand out clearly as shifts in a different direction rather than magnifications of an existing trend.

The timing of the first budget cuts also facilitates attributing observed changes to the budget cuts. Reductions for the school year 1975-76 were announced in the spring of 1975. Because there was no previous warning of impending cuts, it can safely be assumed that the 1974-75 data do not reflect any anticipation of the cuts.[1] And since changes in the school programs must be made all at once at the beginning of a term rather than gradually, the data for the start of the 1975-76 school year capture the whole effect of the first cuts. In other words, data for the two years provide definite before and after measures. Similarly, the changes in 1976-77 should accurately describe the response to the second budget cuts.

The relative stability of the organization of the schools during the period immediately preceding the cuts and of the environment during the period under study (except for the availability of financial resources) also makes it possible to attribute observed changes in the organization of the schools to the budget cuts with some confidence. At the central administration level, the absence of major change in administrative procedures or legal requirements removes these as rival explanatory factors. At the school level, the use of teacher time and the instructional programs were relatively constant for a few years before the cuts (see Table 2). Pupil characteristics, the major aspect of the schools' environment, also remained relatively constant during the period of budget reductions, at least in the aggregate, in terms of both enrollment and other characteristics (Tables 1 and 3). This, of course, does not rule out the possibility of significant changes in some schools. However, the correlation coefficients of all the variables describing pupil characteristics for 1974-75 and 1975-76 were high (Table 3), suggesting that any major shifts were the exception rather than the rule.

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[1] There was no public advance warning of the city's problems. Even though the bond market became closed to the city in early 1975, as late as 1974 Standard and Poor had actually raised the city's bond rating.

3. Some of the reasons for different responses can be explored. Although the schools have many similarities, they also have important differences--in their pre-cut organizations, in the characteristics of their pupils and communities, and in the characteristics of their administrators. (The specific differences and their significance are discussed in Chapter 4.) To the extent that there is

TABLE 2

RESOURCE ALLOCATION BEFORE BUDGET CUTS-- ALL REGULAR HIGH SCHOOLS

	1972-73	1973-74	1974-75
Percent teacher time for			
Instruction	84.4	84.2	84.0
Guidance	7.4	7.4	7.3
Organization and administration	3.8	3.9	3.9
Supervision and curriculum	4.4	4.5	4.8
Average class size			
Academic schools	30.0	29.0	29.4
Vocational schools	29.6	28.8	28.0
Average number of subjects taken per pupil per day			
Academic schools	6.10	6.31	6.16
Vocational schools	6.95	6.91	7.13

Source: Calculated from data in New York City Board of Education, Organization of the High Schools, pp. 11-12, 19-19A, 20-20A.

TABLE 3

PUPIL CHARACTERISTICS

	Mean[a]		Correlation Coefficients
	1974-75	1975-76	1974-75 with 1975-76
Ethnicity			
Percent White	37.4 (30.7)	35.3 (30.3)	.996
Poverty			
Percent free lunch eligibles	44.2 (27.6)	44.6 (26.1)	.948
Stability			
Percent average daily attendance	75.1 (8.1)	72.0 (8.1)	.946
Turnover rate	21.9 (8.6)	20.0 (7.8)	.839
Achievement			
Percent 2+ years below grade in reading	50.0 (24.0)	50.3 (23.1)	.909

Source: Calculated from data in New York City Board of Education, School Profiles (issued annually), pp. 78-1 to 78-111.

[a] Based on 94 schools; standard deviations in parentheses.

variation in the responses, it should be at least partly due to these differences. An opportunity is therefore afforded to study the role of certain organizational and environmental characteristics in shaping the responses to budget cuts.

4. Responses in crisis versus noncrisis situations can be compared. Because of the size, timing, and unexpectedness of the first budget cuts, the situation faced by the schools meets Hermann's definition of a crisis, which is a situation that (1) threatens high priority values, (2) presents a restricted amount of time to respond and (3) is unexpected or unanticipated.[1]

The second cuts were not as unexpected. As the implications of the fiscal crisis became clear throughout 1975, it was obvious that further cuts would be sustained. Because the second cut was expected and allowed more time to plan a response, the situation the second year does not qualify as a crisis according to the above definition. This setting therefore provides an opportunity to compare responses to budget cuts in both crisis and noncrisis situations.

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[1] Charles F. Hermann, "Some Consequences of Crisis Which Limit the Viability of Organizations," Administrative Science Quarterly 8 (June 1963):64.

While the New York City high schools during the fiscal crisis afford on the whole an excellent opportunity for studying the process of decline, the setting does not offer the opportunity to explore the responses to different sizes of budget reductions. Since all the schools received the same proportional cut, the analysis of the responses to this cut reveals nothing about the expected response to much smaller or larger cuts. It is impossible to know over what range of cuts the findings would hold.

Domain Changes

The impact of large budget cuts on schools can, of course, be studied from many different perspectives. The specific focus chosen for this study is changes in organizational domain: the services provided, the population served, and the technology used.[1]

The problem of how to alter the domain to deal with reduced resources is faced by all administrators forced to implement cutbacks. An organization's domain at any given time is contingent upon a particular level of support from the environment. If the level of support decreases and if alternative sources of funds are not available, the domain must be altered in one or more of the following ways: reducing or eliminating some or all of the services provided, reducing the population served, or finding a different way to provide the services. Since alternative sources of funding were not available, domain changes in the high schools were unavoidable.

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[1] The concept of organizational domain was first used in reference to health agencies by Sol Levine and Paul E. White in "Exchange as a Conceptual Framework for the Study of Interorganizational Relationships," Administrative Science Quarterly 5 (March 1961):583-601. James D. Thompson, in Organizations in Action (New York: McGraw-Hill, 1967), p. 26, pointed out that with slight modification of the terms the concept was useful for analyzing all types of complex organizations.

Not all aspects of public school domains can be changed to cope with budget cuts, however. Because the schools are public, the population served cannot be changed by the schools to cope with scarcity, and when the time to respond is short, the basic technology cannot be changed. Domain changes therefore have to be limited to changes in the services provided (the level, the mix or both) and in certain aspects of how they are provided.

The major aims of the research are (1) to describe the domain changes in the high schools and identify the variation among the schools; (2) to explain the variation in terms of the characteristics of the schools and their pupils; and (3) to examine the implications of the findings for theory and policy.

The empirical part of the research was designed to answer the following questions:

1. How did the services provided and the way they were provided change after each budget cut?

2. How did the responses to the second cuts differ from the responses to the first ones?

3. What were the differences in the responses among the schools?

4. To what extent does variation in the organizational and environmental characteristics of the schools explain the variation in the responses?

Method of Analysis

To answer the questions posed above, ninety-four of the city's regular public high schools (sixty-nine academic and twenty-five vocational) were studied using data for the school years 1974-75, the last year before the budget cuts, and 1975-76 and 1976-77, the years for which cuts were made. The five high schools that opened after January 1973 were excluded from the analysis because of the fluctuations in organizational arrangements unique to a new school's first few years of operation. The independent-alternative high schools (of which there were twelve in 1974-75) were also excluded. Their organizational structures cannot be easily compared with the regular high schools, and they are allocated resources on a different basis.

All the data used in this study come from two reports published annually by the Board of Education.[1] The Organization of the High Schools describes how the allocation of general funds for personal services was used in each of the high schools.[2] It shows the number of each type of position (teachers, clerical, and so on) each school has and how the school is organized: the distribution of teacher time among various activities, the average number of subjects taken per pupil per day, the average class size, and the distribution of classes by size. The report is based on data collected centrally from principals for the fall term each year. The Profiles was the source of data on environmental characteristics (that is, the characteristics of the pupils and community) assembled centrally by the Office of Educational Statistics for all of the city's public schools. Definitions of the variables used from both sources and descriptions of how they are computed are provided in later sections as they are introduced into the analysis.

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[1] Board of Education, Division of High Schools, Comparative Analysis of the Organization of the High Schools for the Fall Term (annual); and Board of Education, Office of Educational Statistics, School Profiles (annual).

[2] General funds include city tax levy funds, capital funds for vocational education, and state formula grants. The formula by which they are allocated to the individual high schools is described in Appendix A. General funds, which were subject to the budget reduction, make up about 91 percent of the Board of Education's total budget. The other 9 percent is federal funds.

Reliance on already collected data has certain advantages for a study of this type, the major one being the low collection cost. This is not a trivial advantage, because the data collection is often the most costly phase of a research effort. A complete description of the schools' domain changes and the factors determining the changes would require extensive additional data. However, limiting the analysis to available data is a prudent strategy for an exploratory study of a subject that has not been well researched. Many important questions can be answered and the findings used to guide future data collection efforts.

Already collected data also has the advantage of being non-reactive. When using data not produced specifically for the study the researcher does not have to worry about the possibility of the producers of the data deliberately biasing the data to affect the outcome of the study. There may, of course, be other biases or errors the researcher may or may not know about.[1] Given the turmoil caused by the budget cuts, it might be very difficult to obtain unbiased data on what happened from direct reports from the individuals involved.

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[1] Eugene J. Webb, Donald T. Campbell, Richard D. Schwartz, and Lee Sechrest, Unobtrusive Measures: Nonreactive Research in the Social Sciences (Chicago: Rand McNally College Publishing Co., 1966), p. 53.

The major disadvantage of relying on published data is that the data do not always provide exactly what is needed to answer the questions posed by the investigator. Variables may have to be omitted or proxies used because specific data are not available, and certain questions may have to go unanswered. Overall, lack of appropriate data was not a serious problem for this study. However, instances where it was a problem are noted in the relevant sections.

Given the data available, the questions addressed in the empirical part of the research can be answered with varying degrees of precision. Descriptive statistics were used to compare the schools' domain before and after each budget cut. Means and medians were used to measure central tendencies, and standard deviations and frequency distributions to describe the variation among the schools. Because data are available for a large number of schools, it was possible to test the statistical significance of the overall changes from year to year.

Regression analysis was used to explain the observed variation in domain changes among the schools, with changes in domain as the dependent variables and organizational and environmental characteristics as the independent variables. This method of analysis made it possible to determine to what extent the variation in the domain changes among the schools was due to variation in their organizational and environmental characteristics. All the variation could not be explained, however, because of random variation and because quantifiable data are not available for all factors affecting the changes. Some specific missing factors are discussed in Chapter 4.

The differences between the responses to the first cuts (which were made in a crisis situation) and the responses to the second cuts (which were made in a noncrisis situation) are described, but cannot be explained using rigorous statistical techniques. With only two observations, one a crisis situation and the other not, it is only possible to speculate about the reasons for the differences. If many years of data were available, including some crisis and some noncrisis years, multivariate analysis could be used to determine the impact of a crisis situation using the observed change as the dependent variable and a measure of the degree of crisis (or simply crisis versus noncrisis) as one of the independent variables.

While this analysis yielded a considerable amount of information on how and why the domains were changed, other changes may also have been made but could not be detected because of the level of aggregation of the data and because an organization's domain cannot be completely described in quantitative terms.

Outline of the Study

Chapter 2 provides the theoretical framework for the research. On the basis of a review of the literature on schools as formal organizations, organizational change, and behavior in crisis situations, a case is made for predicting either of two alternatives as the likely response to the budget cuts.

The next two chapters report the findings of the empirical part of the research. Chapter 3 describes domain changes that were made in response to each budget cut and identifies the variation among the schools. Chapter 4 focuses on explaining this variation. A number of hypotheses are developed and tested to identify the extent to which the variation can be explained in terms of organizational and environmental characteristics.

Chapters 5 and 6 deal with the implications of the findings of the empirical research. The theoretical implications of the findings for understanding the processes of organizational decline and thus of organizational change in general are discussed in Chapter 5. Chapter 6 evaluates the impact of the domain changes on the schools and suggests areas where policy changes may be needed, especially if further cuts are made. A summary and conclusions are presented in Chapter 7.

CHAPTER 2

PREDICTING THE DOMAIN CHANGES

The New York City high schools faced a sudden, large decrease in critical financial resources without any corresponding decline in the demand for their services and without an alternative source of funds. As indicated in Chapter 1, under these circumstances at least some domain change will have been inevitable. The purpose of this chapter is to predict, on the basis of existing theory, what kinds of domain changes will have been made in the high schools following the budget cuts. First the possible domain changes are identified. Then the cases for predicting two different alternatives are evaluated.

Managing the High School Domains

In the New York City public high schools the principals have the primary responsibility for managing the domains of their own schools. The Division of High Schools allocates resources among the schools according to a formula that takes into account the number of pupils, the average number of subjects taken per pupil per day, and the need of the pupils for remedial programs.[1] The principal is then responsible for intraschool allocation decisions, including what kinds of staff to employ, how teachers should spend their time, and what the class structure should be (that is, class size and the number of subjects taken per pupil per day).

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[1] The formula is described in Appendix A.

The decisions about what changes to make in the domains to adapt to reduced resources were therefore made at the school level. In each school there were many alternatives, but at the same time, the options were not unlimited. This section examines each aspect of the domains to identify what could and could not have been changed.

How services are provided

In schools, basic instructional technology, which is an aspect of how services are provided, cannot be changed, at least in the short run. The technology revolves around the interaction between pupils and teachers in a classroom, and there are few substitutes for the interaction or for the usual one-teacher-to-a-classroom arrangement.[1]

Class structure, however, is another important aspect of how services are provided, and it can be changed. Even given the one-teacher-to-a-classroom constraint there are many alternative arrangements possible with a given number of pupils and teachers. To take a very simple example, consider a school with two teachers each teaching one class, and two pupils. The class structure can be arranged so that the two pupils take two subjects, with two pupils in each class, or only one subject, with each pupil in a class alone.

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[1] Charles E. Bidwell and John D. Kasarda, "School District Organization and Student Achievement," American Sociological Review 40 (February 1975):58.

It is important to realize that altering the class structure does not affect the number of pupils or teachers. However, for reasons discussed later, it may be either necessary or desirable to change the class structure when the level of resources for instruction declines. Changing class structure therefore could have been an important mechanism for coping with budget cuts.

Population served

Public high schools must provide services to all who apply. Therefore, the population served cannot be reduced as a way to deal with budget cuts.[1] It is important to recognize, however, that subtle ways of reducing the population served are sometimes possible. For example, it has been suggested that in organizations such as schools where the population served cannot be controlled, attention may be focused on certain categories of clients while others are ignored.[1] Lack of attention to their needs may prompt some students either to drop out of school or to go to private schools. Whether or not selective inattention has been practiced (or increased) as a result of the budget cuts, and if so, what the consequences have been cannot be determined from the data available for this study.

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[1] Although some schools can be selective about who they admit, they cannot reduce the number admitted or dismiss those already enrolled as a way of dealing with budget cuts.

Services provided

When instructional technology is fixed, and the population served cannot be cut back, a reduction in the level of at least some services is unavoidable. When the level of services is lowered, however, the mix of services can either be changed or left the same. Since schools provide a variety of services, the New York City high school administrators could have chosen to cut back all equally or to have cut back some more than others.

To summarize, then, the basic instructional technology and the population served are dimensions of school domains that cannot be changed. Therefore a decrease in the level of at least some services was unavoidable when the budget cuts were imposed. Changes in the mix of services and class structure were possible, but not inevitable. The rest of this chapter deals with the question of whether or not, given an inevitable reduction in the level of at least some services, one would expect to find changes in the mix of services and the class structure in the New York City high schools following the budget cuts.

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[1] Richard O. Carlson, "Environmental Constraints and Organizational Consequences: The Public School and Its Clients," in Behavioral Science and Administration (Chicago: National Society for the Study of Education, 1964), p. 262-76.

Two Alternative Responses to Budget Cuts

While the process of adapting to budget cuts has not been well studied, there is an extensive literature on the more general subject of organizational change. In addition, the characteristics of schools as formal organizations and the behavior of individuals and groups in situations of crisis and other types of severe stress have received considerable attention.[1] This research can be drawn upon as a basis for predicting the response to the budget cuts in the high schools.

A review of the literature on organizational change provides evidence for the existence of two quite distinct responses to a substantial change in the environment. These are labelled here the "no change" and "change" responses. Adopting the "no change" response means that whenever there is an option to change or not to change an aspect of the domain, the choice will be not to change. Selection of the "change" response, on the other hand, means that the decision will be to make the change.

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[1] New York City's financial position in 1975 has been widely referred to as a crisis situation. Using Hermann's definition of a crisis as a situation that threatens high priority values, allows only a limited time to respond, and is unexpected (Hermann, p. 64), the budget cuts could reasonably be said to have represented a crisis for the high schools. Severe stress is also an appropriate term to describe the situation. J. Eugene Haas and Thomas E. Drabek, in Complex Organizations: A Sociological Perspective (New York: Macmillan, 1973), p. 120, define organizational stress as the discrepancy between capacity and demand.

How is it possible that two seemingly opposite responses to the same situation can be predicted for the same set of organizations responding to the same environmental change? Part of the explanation lies in the particular research drawn upon to make the cases. None of the works, either theoretical or empirical, refers to exactly the same type of organization and situation under study. Research from a wide variety of fields, including education, public administration, political science, sociology, and psychology, was reviewed. All the studies had different purposes, focuses, and levels of analysis. Because of these differences their findings do not necessarily have to be viewed as contradictory. In other words, it is not a case of analyses of similar organizations in the same situations producing different results. Perhaps with more research behavior in situations of decreased resources will become easier to predict.

Another possible reason why both responses seem plausible is related to timing. The two types of response may not really be different at all, but rather represent different stages in the same overall process of change. While many researchers have pointed out that adaptation to environmental change may take time, the actual periods are not specified. Fink, Beak, and Taddeo, for example, see organizational adaptation to crisis as a four stage process involving shock, defensive retreat, acknowledgment, and finally, adaptation and change.[1] They do not say, however, if it is likely to take weeks, months, or years to reach the final stage.

In the case of the New York City high schools, a comparison of the responses to the two separate cuts should help to determine whether in fact two stages of one process are being observed or two alternative processes. A shift from "no change" to "change" would suggest that the possibility of only one process cannot be ignored. The reverse, however, a shift from "change" to "no change" would argue more for two distinct processes. The same response both years would not provide any evidence either way.

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[1] Stephen L. Fink, Joel Beak, and Kenneth Taddeo, "Organizational Crisis and Change," Journal of Applied Behavioral Science 7 (January 1971):15.

The Case for "No Change"

The case for predicting no change in the mix of services or in the class structure rests on the strength of the factors inhibiting change. It is argued here that the forces opposing change, which are strong in all organizations, are especially strong in large public schools and are exacerbated in a situation of budget cuts. It is therefore reasonable to predict that a "no change" response to the budget cuts will have been adopted in the New York City high schools.

The prospects for significant change in an organization are inhibited at two points in the process of adapting to an environmental change. The first is at the search stage, when alternative responses are being investigated, and the second is at the implementation stage, when the new behavior patterns have to be accepted and incorporated into the fabric of the organization.

The limited search process

The March and Simon and Cyert and March tradition of organizational study predicts that the search for alternative patterns of behavior will be limited and concentrated in the neighborhood of the current alternative.[1] Three major factors that promote this are the costliness of the search process, the difficulties involved in obtaining adequate information to evaluate and compare alternatives, and the limited capabilities of individuals both to propose and evaluate alternatives.

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[1] James G. March and Herbert A. Simon, Organizations (New York: John Wiley and Sons, 1958); Richard M. Cyert and James G. March, A Behavioral Theory of the Firm (Englewood Cliffs, N.J.: Prentice-Hall, 1963).

Cost of the search. Searching for new alternatives is costly in terms of time and money. Unless resources are abundant, the pressures of daily routines are likely to make it difficult to obtain enough resources to consider a large number of alternatives.

During the fiscal crisis both time and money were short, a situation not conducive to considering a wide range of alternatives. Search tends to become less fruitful as stress and time are pushed to the limit.[1]

Lack of information. Even when resources are adequate to allow for an extensive search for alternatives, some of the information needed to compare the costs and benefits of the alternatives is impossible to obtain at any cost. Obtaining the necessary information is particularly difficult in organizations such as schools where the production process and outputs are not clearly defined. When the consequences of proposed alternatives cannot be confidently specified, trying to evaluate a large number of alternatives may simply create more confusion rather than clarify the situation.

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[1] March and Simon, p. 116.

Limited capabilities of the decision makers. The ability of any one individual to propose and evaluate alternatives is limited. Therefore, one way to promote the consideration of a wide number of alternatives is to involve a large number of persons with diverse backgrounds in the search and evaluation process.[1] It is argued here that in the high schools during the fiscal crisis both the number and diversity of the decision makers were likely to be especially limited. It is therefore unlikely that a large number of alternatives was considered.

The number involved in the search process is likely to have been limited because of the contraction of authority that tends to occur during crisis.[2] In the case of the high schools, the number involved was probably also limited, at least the first year, by the fact that the search process took place over the summer when few staff members and no pupils were around.

There tends to be a lack of diversity of viewpoints among school staff even under the best of circumstances. Teachers form the majority of the labor force, and administrators are almost always former teachers. Because they have all had similar training and have occupied the same positions in the organization, they tend to have many similar ideas.

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[1] James Q. Wilson, in "Innovation in Organizations: Notes Toward a Theory," in Approaches to Organizational Design, ed. James D. Thompson (Pittsburgh: University of Pittsburgh Press, 1966), p. 201, hypothesizes that "the greater the diversity of the organization, the greater the probability that major innovations will be proposed."

[2] Hermann, p. 70.

When organizations lack diversity in their staffs, their members tend to develop what Kaufman calls "mental blinders," which prevent them from considering a wide range of alternatives.[1] The most commonly proposed solution to the problem of mental blinders is somehow to increase the diversity of viewpoints represented. This can be done by recruiting from different labor pools, or training and retraining existing members to increase exposure to new ideas. During the fiscal crisis, none of these was feasible. Teachers and administrators were being fired, not recruited, and the number of newly trained teachers greatly reduced because of the role of seniority in making layoffs. Obviously, too, there were no significant resources available for retraining, and teachers whose jobs were in danger were not likely to invest their own resources in further teacher training.

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[1] Herbert Kaufman, The Limits of Organizational Change (University, Alabama: University of Alabama Press, 1971), p. 15-23. The problem of "mental blinders" may be somewhat mitigated by the professional nature of the staff. Jerald Hage and Michael Aiken, in Social Change in Complex Organizations (New York: Random House, 1970), p. 32, found that the greater the complexity of an organization (meaning the more highly trained and educated the staff) the greater the rate of program change.

The crisis atmosphere is also likely to have impaired the capability of those involved in the search process to assess accurately the implications of any alternatives suggested. Holsti, in his review of information on decision making under stress and crisis, concludes that performance is impaired in situations of high stress and time pressure. Under these trying circumstances the decision maker tends to lose the broader perspective, and the ability to estimate the range of possible consequences is thus diminished.[1]

Barriers to the implementation of change

In addition to the limited search for alternatives as a factor inhibiting significant change, specific barriers to changes are encountered even when change is proposed. The major barriers are the high cost of implementing change and the resistance of individuals to change.

High cost of change. Every organization has a large store of sunk costs, the investment of time, effort, and money that has gone into making it the way it is. March and Simon suggest that sunk costs are responsible for a considerable part of the inertia found in large organizations. To make changes in facilities or in patterns of behavior, many of these costs have to be incurred again. Considerable time, effort, and money have to go into building or rearranging facilities and training people in new procedures. To obtain a decision in favor of change, then, the benefits of the new way must be greater than the benefits of the old way plus the cost of changing. The high cost of changing means that change and no change are not equal alternatives. Everything else being equal, no change will be chosen because of the costs involved in bringing about change.[1]

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[1] Ole R. Holsti, "Crisis, Stress, and Decision-Making," International Social Science Journal 23.1 (1971):66-67.

Schools as organizations are likely to have large sunk costs relative to many other organizations. The large capital investments in buildings constitute large sunk costs. Once built, the physical arrangements are expensive to alter, so that schools cannot be easily consolidated, subdivided, or otherwise rearranged. Some organizations can avoid large sunk costs of this type by flexible use of space and leased equipment, but these options are not usually available to schools.

The fact that the schools have been around a long time, performing approximately the same functions, also contributes to an especially large store of sunk costs. Kaufman makes the point that the accumulations of official constraints on behavior, including laws, rules and regulations, and collective bargaining agreements grow over time and rarely decrease.[1] The more of these there are, the greater will be the costs of change.

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[1] March and Simon, p. 173.

Another characteristic of schools that makes the cost of change high is the restriction imposed by the elongated nature of the technology.[2] Any change must take into consideration the need to provide for the pupils who have already entered the system. For example, if a foreign language program has been divided into four parts, one to be taken each year, the school has some obligation and may feel some pressure to provide the whole sequence to those who have already started the program.

The costs of change in schools are particularly high during the budget cuts because of the lack of mechanisms to implement this kind of change. Having organization members used to change and procedures available for implementing change can help keep the costs of change down. Even though New York City high school principals and teachers have been used to some kinds of change, they have not been used to cutbacks. Until the recent budget cuts, the schools have enjoyed continuously increasing appropriations. Mechanisms to facilitate phasing out or reducing basic programs did not exist.[1]

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[1] Herbert Kaufman, Limits of Organizational Change, p. 39.

[2] James D. Thompson and Frederick L. Bates use the term elongated in, "Technology, Organization, and Administration," Administrative Science Quarterly 2 (December 1957):325-43, to describe a technology that consists of steps where one has to be completed before the next started. School technology can be viewed as elongated because pupils must progress step by step through the system, completing one stage before starting the next.

The high costs associated with change are expected to inhibit change under any circumstances, but will be a particularly strong barrier to change during periods of severe shortage of financial resources. Sunk costs, of course, are not a problem if resources available are great compared with the costs of change.[2] In periods of budgetary famine, the costs of change are more likely to exceed the resources available. Therefore any alternative that does not lead to increased productivity is unlikely to be adopted.

Resistance to change. Individuals are conservative by nature and tend to prefer the known to the unknown under even the best of circumstances. Marris argues that since people can only make sense out of new things when they can be related to familiar ones, the human need for predictability makes resistance a reaction to be expected whenever major change is proposed.[3] It is suggested here that school administrators are especially likely to exhibit conservative behavior and that this tendency will be reinforced in the face of budget cuts.

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[1] Bernard R. Gifford, "The Management of Urban Education," in Urbanicity and Urban Education: A New Look (New York: ERIC Clearinghouse on Urban Education and the Institute for Urban and Minority Education, Teachers College, Columbia University, 1977), p. 48.

[2] Kaufman, Limits of Organizational Change, p. 23-39.

[3] Peter Marris, Loss and Change (New York: Random House, 1974).

The reward system of a public organization has an important effect on risk-taking.[1] It can be argued that the reward system in the schools is not conducive to risk-taking. The reason is that the probability of tangible rewards for doing a good job is low, and the probability of trouble if a wrong choice is made is high.

Schools typically have flat hierarchies. Most of the members are teachers, and most remain teachers. Since only a few ever become principals and only a few principals ever become superintendents or other high level administrators, the probability of promotion as a reward for doing a good job is not high.

At the same time, the public tends to be quick to find fault with the performance of officials of public organizations.[2] Given the tradition of public involvement in education, principals are particularly vulnerable to censure when they make what are perceived of as mistakes. Public pressure can on occasion cause a principal to lose his or her job, but is unlikely to be used to encourage a principal's promotion out of the school for doing a good job. In the case of a principal doing a good job the pressure may be to keep the principal in that job.

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[1] Donald P. Warwick, A Theory of Public Bureaucracy, (Cambridge: Harvard University Press, 1975), p. 101.

[2] Louis C. Gawthrop, Bureaucratic Behavior in the Executive Branch (New York: Free Press, 1969).

Another factor that may serve to inhibit a principal from favoring change is the uncertainty stemming from an output and technology that are not well defined. When it is difficult to evaluate the consequences of a change, change is inherently more risky than when the outcomes are predictable.

The reward system and the difficulty in evaluating the consequences of change can be expected to steer school administrators away from risk-taking towards what Downs calls "conserver" behavior, which involves holding on to what you have.[1] During budget cuts they may be particularly concerned about holding on to what they have for fear that anything given up may be gone forever. Principals may fear, for example, that giving up a particular type of service completely may be taken as a signal that it was not highly valued and therefore not worthy of restoration should available funds later increase.

In addition to resisting change in general, individuals can be expected to resist specific changes that will cause them to lose something they value. Expectancy theory predicts that a person's motivation to perform in a particular way depends on, among other things, the attractiveness of the outcomes involved.[1] An outcome involving loss of income or power will therefore generate resistance from the loser. Since budget reductions inevitably have adverse effects for someone, almost any proposed change will result in resistance. If the individuals and groups affected are powerful enough, then they may be able to veto the change.

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[1] Anthony Downs, Inside Bureaucracy (Boston: Little Brown, 1966), p. 88.

There is some evidence that vested interests do in fact pose an important barrier to change. In studying New York City government, Sayre and Kaufman found that line administrators faced such an awesome combination of forces with vested interests in the existing situation that they were rarely willing to take the risks required to make extensive changes in policy, organization, and procedures.[2] It seems reasonable to predict that during the budget cuts the principals would have been particularly sensitive to the need for support from all staff members and been unwilling to risk losing that support to implement any change that could be avoided.

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[1] Edward E. Lawler III, Motivation in Work Organizations (Monterey, California: Brooks/Cole, 1973), p. 51.

[2] Wallace S. Sayre and Herbert Kaufman, Governing New York City: Politics in the Metropolis (New York: Russell Sage Foundation, 1960), p. 303.

Large budget cuts make vested interests a particularly effective barrier to change because the best-known ways of overcoming this barrier require additional money or time. In periods of expansion, people from whom things are taken can often be compensated for losses by giving them something else to replace them.[1] Obviously this would be difficult to do during a period of fiscal crisis. Incremental rather than major change has also often been recommended as a way of overcoming resistance to change, but the short time to respond did not allow that option.[2]

Conclusions: the case for "no change"

The above discussion suggests that when budget cuts are made in schools, especially in a crisis atmosphere, it is very likely that only a very limited search for alternatives will be made and that any proposed change will be resisted. Consequently the minimum possible changes in domain can be predicted for the New York City high schools following the budget crisis. This implies that only the level of services will have been changed; the mix of services and the class structure will have remained unchanged.

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[1] Aaron Wildavsky, "Rescuing Policy Analysis from PPBS," Public Administration Review 29 (March/April 1969): 192.

[2] See, for example, Kaufman, Limits of Organizational Change, p. 93-96.

The Case for "Change"

In spite of the strength of the factors inhibiting change, organizations are not impervious to change. Change will occur when the stimulus for change is strong and there are ways available to overcome the barriers to change. It is argued here that substantial budget cuts can provide sufficient stimulus for change in mix of services and structure as well as level of services, and that a situation of budget cuts and a crisis atmosphere offer opportunities to overcome the barriers to the implementation of change. On this basis it is possible to predict that a "change" response to the budget cuts will have been adopted in the New York City high schools.

Budget cuts as a stimulus for change

Budget cuts may make change desirable because all services are not equally valued or necessary because of legal constraints. Budget cuts may also be a stimulus to change because of their effect on organizational size.

All services not equally valued. All the services provided by schools are not equally valued. The central function of schools (or core technology, to use Thompson's term[1]) is classroom instruction. Historically, schools started as single classrooms, with administrative and support services added as the need for coordination developed and as schools grew large enough to accommodate specialization (for librarians, guidance counselors, and so on).[1] The major goals of schools--academic achievement, job preparation, and socialization--are all achieved primarily in the classroom.

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[1] Thompson, p. 11.

A study of the high schools in the nation's forty-four largest cities provides evidence of the priority on instruction. The acquisition of basic skills and knowledge ranked first among the stated goals of school principals.[2] Therefore greater cuts in non-instructional services than in instructional ones would be expected.

According to Thompson, organizations act to protect the core technology from uncertainty so it can function as much as possible as a closed system.[3] This implies that when budget cuts are imposed, classroom instruction will be protected from cuts as much as is possible.

Gerwin's study of the budget process in an urban school district provides evidence to support this expectation. He found that when requirements exceeded resources by enough that real cuts were required rather than accounting tricks, activities whose objectives were only indrectly related to what decision makers considered to be the main purposes (such as health services) were cut first.[1]

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[1] Charles E. Bidwell, "The School as a Formal Organization," in James G. March, ed., Handbook of Organizations (Chicago: Rand-McNally, 1965), p. 995.

[2] Robert Havighurst, Frank L. Smith, and David E. Wilder, Profile of the Large-City School (Washington D.C.: National Association of Secondary School Principals, 1970), p. 3:3.

[3] Thompson, p. 11.

Evidence to support the proposition that priority activities will be protected has been obtained from laboratory studies of behavior under stress. Chapman and Kennedy studied how air defense crews behaved when their task loads were increased and found that the crews focused on those tasks perceived to be most important and tried to devise more efficient ways of handling them. Less important ones were left out.[2]

Legal constraints. Legal constraints may make it impossible to avoid domain changes in an organization following budget cuts. Many service standards and union contract provisions governing working conditions accumulate over the years. When budgets are cut, these regulations and standards are not necessarily changed. Therefore, to continue to meet them, components of the organization not affected by these constraints have to absorb the cuts.

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[1] Donald Gerwin, Budgeting Public Funds: The Decision Process in an Urban School District (Madison: The University of Wisconsin Press, 1969), p. 143-44.

[2] Robert L. Chapman and John L. Kennedy, "The Background and Implications of the Rand Corporation Systems Research Laboratory Studies," in Albert H. Rubenstein and Chadwick J. Haberstroh, eds., Some Theories of Organization (Homewood, Illinois: Dorsey Press and Richard D. Irwin, 1960), p. 139-146.

New York City high schools are particularly likely to be affected by such constraints. Among other things, the teachers' contract limits the duties that can be performed by teachers, limits the length of the working day, and specifies maximum allowable class sizes. To continue to comply with these restrictions, then, some changes in the mix of services and class structure are likely to be necessary.

Change in size. There have been many empirical studies of the relationship between size and other structural variables (the relationship between the number of administrators and other staff, for example), and although there is not complete agreement, in the majority of studies size does appear to have a causal role. In other words, as organizational size varies, structural arrangements tend to vary also.[1]

Unfortunately, theoretical reasons for this relationship have not been well established so the implications of the empirical findings for the organizations and situations being studied here are hard to assess. Nevertheless, these studies do suggest that different structures may be appropriate for different sizes of organizations, and since the sizes of the schools (in terms of resources) did change, it is not unreasonable to expect changes in structure too.

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[1] John R. Kimberly, "Organizational Size and the Structuralist Perspective: A Review, Critique, and Proposal," Administrative Science Quarterly 21 (December 1976):581. Organizational size can be measured many ways: level of resources, number of employees, number of clients, number of transactions, and so on. In terms of level of resources, budget cuts obviously imply a change in the size of the organization.

Freeman and Hannan did, in fact, find changes in the structure (the size of the administrative component) of school districts as they declined.[1] The same findings cannot necessarily be predicted for New York City high schools because Freeman and Hannan were studying the response to declining enrollment (another common measure of size) rather than declining resources.[2] Nevertheless, their findings do support the idea that it is reasonable to predict change in mix of services or class structure as a consequence of change in size in educational organizations.

Overcoming the barriers to implementation of change

Theoretical and empirical research on organizational behavior during crisis, disaster, and other types of severe stress suggests that change may be easier to achieve during such periods than under normal circumstances. This implies that if the desirability of a particular change has been established, the prospects for being able to implement it are improved under these conditions. It is suggested here that the situation of budget cuts in the New York City high schools provided opportunities for reducing the cost of change and for overcoming some of the resistance to change.

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[1] John Freeman and Michael T. Hannan, "Growth and Decline Processes in Organizations," *American Sociological Review* 40 (April 1975):215-28.

[2] The important difference is that with declining enrollment causing the loss of staff, school districts could lower the number of teachers without affecting the pupil-teacher ratio. The New York City high schools could not cut the number of teachers without increasing the pupil-teacher ratio. Declining enrollments are also predictable and not a crisis.

Reducing the cost of change. Organizational change has been characterized as having three stages: an unfreezing period, where existing patterns of behavior are broken down; a period of change, where reform is introduced; and finally, a refreezing stage, where new structures and procedures are incorporated into the organization and the behavior of the members.[1] To implement the changes in service levels required by the budget cuts, the schools had to be "unfrozen." This afforded an opportunity to make other changes as well. When the costs involved in breaking up old patterns of behavior and introducing new ones are being incurred anyway, the extra cost involved in making additional changes is likely to be small relative to what it would be if they were introduced on their own.

Overcoming vested interests. During periods of crisis, interest groups do not have as much of an opportunity to protect their own interests. The contraction of authority that accompanies crisis[1] means that fewer interests are consulted, which decreases the likelihood of a veto. Also, the short time to respond means less time for organized opposition to change to develop.

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[1] Kurt Lewin, "Group Decision and Social Change," in Theodore Newcombe et al., eds., Readings in Social Psychology (New York: Holt, 1947), pp. 330-34.

This reduction in the opportunities to protect vested interests may be particularly important in schools where traditionally there are active interest groups in the community. During a crisis, school administrators may be able to avoid consulting these groups during the decision making period and be able to implement the changes before the opposition can be organized. This would have been particularly easy for administrators to do in the case being studied, at least the first year, because planning took place over the summer when fewer were around.

During periods of crisis interest groups may not be as inclined to protect their own interests as strongly as under normal circumstances. Interest groups may not be as reluctant to give up things they value if others must too.[2] Also, the threat to high priority values caused by a crisis may make people more cooperative and willing to forget their differences to work to preserve high priority values of the membership as a whole. Increased cohesiveness as a common purpose (survival) draws people together has often been observed in social organizations during disasters.[1]

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[1] Hermann, p. 70.

[2] Eugene Bardach, "Policy Termination as a Political Process," Policy Sciences 7 (1976):130.

Conclusions: the case for "change"

The above discussion suggests that budget cuts of the size imposed on the New York City high schools and the crisis decision making context associated with them make it very likely that change in the mix of services to preserve instruction and in class structure will have occurred in addition to service level reductions.

A warning about any observed change is necessary, however. Thompson and Hawkes suggest that a temporary ("synthetic") organization will be mobilized in response to a disaster and that it will be designed to focus on performing its assigned tasks without particular concern for efficiency. They also predict that when the disaster is over, normal processes will re-emerge and the synthetic organization will disappear.[2]

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[1] Caution must be exercised in extrapolating behavior during disasters to behavior during financial crises. The reduced resources associated with financial "disasters" may prompt fighting over the distribution of a smaller pie instead of cooperation.

[2] James D. Thompson and Robert W. Hawkes, "Disaster, Community Organization, and Administrative Process," in Man and Society in Disaster, eds. George W. Baker and Dwight W. Chapman (New York: Basic Books, 1962).

While it is hard to imagine what a temporary school organization would be like, it is possible that the distinquishing feature would be a willingness of teachers to accept poorer working conditions, including perhaps even violations of their contract. They might, for example, in the interest of keeping the schools functioning, put with conditions such as classes larger than the contractual maximum. Teachers are unlikely to be willing to tolerate such conditions indefinitely, however. Therefore, any changes precipitated by a crisis may not represent long term solutions.

"No Change" or "Change"?

On one hand a case has been made to predict no change in the mix of services and class structure in New York City high schools following the budget cuts. On the other, a case has also been made to predict change in the mix of services to preserve instructional services and change in class structure.

These two alternatives represent opposite ends of a continuum. In practice the schools will be distributed somewhere in between, with a tendency to be closer to one end or the other. On the basis of previous research, however, it is not possible to predict which end. Both seem plausible. Therefore the empirical analysis to describe the domain changes was designed to detect either.

CHAPTER 3

THE RESPONSE TO THE BUDGET CUTS

In the previous chapter it was argued that a plausible case can be made for predicting either "no change" or "change" in the mix of services and class structure of the high schools in response to budget cuts. It was also pointed out, however, that the two responses are not completely distinct, but represent the extremes of a continuum where everything is absolutely equally affected at one end and everything differently affected at the other. In most schools, positions somewhere in between will have been adopted.

The purpose of this chapter is to examine the actual changes made in the mix of services and class structure to determine the position of the schools as a group and the distribution of the individual schools along this continuum. Taking the mix of services and class structure in turn: (1) the possible responses to the budget cuts are identified, (2) the operational measures used to determine which response was adopted are described, and (3) the actual responses are described and discussed.

Mix of Services

Possible responses

Two major categories of services are provided in the high schools: instructional services, which include all classroom teaching, and administrative and support services, which include the services needed to administer the schools and provide supportive services such as libraries and guidance counseling. Given these two types of services, the following responses to budget cuts are possible:

1. Selective cuts to preserve instructional services (proportionately greater cuts in administration and support than instruction).

2. Selective cuts to preserve administrative and support services (proportionately greater cuts in instruction than in administration and support).

3. Equal cuts in both instruction and administration and support.

In terms of domain the first two alternatives represent "change" responses, and the third, "no change." Because of the high value placed on instructional services (see Chapter 2), it is expected that a "change" response to preserve instruction will be more common than one to preserve administration and support.

Operational measures of change in the mix of services

Ideally, change in the mix of services should be measured in terms of change in outputs. However, measures of the outputs of administrative and support services are unavailable, and measures of the output of instructional services are incomplete. Therefore the numbers of full-time equivalent positions devoted to each type of service are used as input indicators of the levels provided.

A full-time teaching load is twenty-five periods a week; a school therefore has one instructional position (or full-time equivalent teaching position) for every twenty-five periods of instruction provided. The source of data on the number of periods taught is the schedule cards of the individual teachers, which indicate how each period of each day is used.[1] The total number of instructional positions (IP) in a school is calculated as follows:

$$IP = \sum_{\substack{\text{teaching}\\\text{staff}}} \left(\frac{\text{periods taught per week}}{25} \right)$$

From this definition it can be seen that the number of instructional positions can be altered by changing either the number of teaching staff or how individuals use their time.

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[1] The school totals are reported by the principals and published in New York City Board of Education, Organization of the High Schools, pp. 11-12.

The number of full-time equivalent administrative and support positions (ASP) can be calculated as a residual. Given total positions (TP) and instructional positions:

$$ASP = TP - IP$$

To give an example, the staff of a hypothetical school has the following composition and distribution of time:

Staff	Periods Per Week For Instruction	Periods Per Week For Administration and Support
Principal	1	24
Secretary	0	25
5 Teachers	20	5
5 Teachers	25	0

With a total of 12 positions, this school has 9.04 instructional and 2.96 administrative and support positions:

$$TP = 1 + 1 + 5 + 5 = 12$$

$$IP = \frac{1}{25} + \frac{5(20)}{25} + \frac{5(25)}{25} = 9.04$$

$$ASP = 12.00 - 9.04 = 2.96$$

To determine the type of response made to the budget cuts, the change in the proportion of instructional positions before and after cuts was examined:

$$\triangle \% \text{ IP} = \left(\frac{\text{IP}_2}{\text{TP}_2} \times 100\right) - \left(\frac{\text{IP}_1}{\text{TP}_1} \times 100\right) ,$$

where IP and TP are defined above and the subscripts 1 and 2 represent successive time periods.

A positive $\triangle \%$ IP (that is, an increase in the proportion of instructional positions) indicates a selective response to preserve instruction. A negative $\triangle \%$ IP (that is, a decrease in the proportion of instructional positions) represents a selective response to preserve administration and support. A $\triangle \%$ IP equal to zero (that is, no change in the proportion of instructional positions) means equal cuts.

It is not expected that any schools will necessarily have $\triangle \%$ IP exactly equal to zero. Some small deviation from zero, x, can still reasonably be considered to indicate equal cuts. Assigning a value to x requires a judgmental decision. Appropriate values for x are discussed later.

It was concluded that:

If	Then the Response Adopted Was:
$\triangle \% \text{ IP} > x$	selective cuts to preserve instruction
$\triangle \% \text{ IP} < -x$	selective cuts to preserve administration and support
$-x < \triangle \% \text{ IP} < x$	equal cuts in both instruction and administration and support

Results and discussion

Changes in the schools as a group. In 1974-75, the last year before the budget cuts, the average school had 174.3 positions (Table 4). In 1976-77, after two budget cuts, the number had declined substantially. The average school then had 138.8 positions, a drop of 35.5 positions, or 20.4 percent (Table 5).

Instructional and administrative and support positions were not equally affected, however. Administration and support was cut proportionately more than instruction, down 26.4 percent compared to 16.0 percent (Table 5). Consequently instructional positions increased from 70.6 percent of all personnel in 1974-75 to 73.0 percent in 1976-77 (Table 4). The net effect of the two budget cuts was thus a change in the mix of services, with instruction being preserved at the expense of administration and support.

Examination of the responses to each cut separately, however, reveals an important difference. Table 4 shows that after the first cut for 1975-76 the mean percentage of instructional positions increased by 2.82 from 70.6 percent to 73.5 percent. This change is statistically significant at the .05 level (t = 11.8), indicating a response to preserve instruction at the expense of administration and support. In response to the second cut, for

TABLE 4

MIX OF SERVICES

Type of Position	Mean Number of Positions[a]			Percent of Total Positions		
	1974-75	1975-76	1976-77	1974-75	1975-76	1976-77
Instruction	124.6 (42.6)	114.3 (37.0)	102.2 (33.0)	70.6	73.5	73.0
Administration and support	49.7 (11.8)	40.0 (9.7)	36.6 (8.9)	29.4	26.5	27.0
Total	174.3 (52.4)	154.3 (45.2)	138.8 (40.4)	100.0	100.0	100.0

Source: Computed from data in New York City Board of Education, Organization of the High Schools, pp. 11-14, using 94 schools.

[a] Standard deviations in parentheses.

TABLE 5

CHANGE IN MIX OF SERVICES

Type of Position	Mean Change[a] 1974-75 to 1975-76	Mean Change[a] 1975-76 to 1976-77	Mean Change[a] 1974-75 to 1976-77	Mean Percent Change 1974-75 to 1975-76	Mean Percent Change 1975-76 to 1976-77	Mean Percent Change 1974-75 to 1976-77
Instruction	-10.3* (7.5)	-12.1* (10.7)	-22.4* (11.0)	- 8.3	-10.6	-18.0
Administration and support	- 9.7* (18.1)	- 3.4* (8.9)	-13.1* (20.4)	-19.5	- 8.5	-26.4
Total	-20.0* (11.6)	-15.5* (12.0)	-35.5* (14.3)	-11.5	-10.0	-20.4

Source: Computed from data used in Table 4.

[a] t - statistics in parentheses; * indicates significant at .05 level.

1976-77, the percentage of instructional positions decreased slightly from 73.5 percent to 73.0 percent. Since this shift of -.45 is not statistically significant at the .05 level (t = 1.7), it was concluded that both instruction and administration and support received equal cuts.

Tables 6 and 7 show that the response to preserve instruction for the two year period was achieved primarily by increasing the proportion of teacher time spent for instruction as opposed to other activities. Table 6 shows that the proportion of teachers actually declined between 1974-75 to 1976-77, from 85.0 percent of total positions to 83.6 percent. However, as Table 7 indicates, the percent of teacher time spent for instruction increased from 83.4 percent to 87.2 percent during the same period. The net effect of these two changes was the previously noted increase in instructional positions from 70.6 percent to 73.0 percent (Table 4).

Looking at the two periods of change separately shows important differences. The first year the proportion of teachers dropped from 85.0 percent to 84.2 percent (Table 6), but this was compensated for by the increase in teacher time for instruction from 83.4 percent to 87.5 percent (Table 7). Consequently the net result was an increase in instructional positions from 70.6 percent to 73.5 percent (Table 4). The

TABLE 6

STAFF COMPOSITION

	Mean Number of Positions[a]			Percent of Total		
	1974-75	1975-76	1976-77	1974-75	1975-76	1976-77
Teachers and assistant principals for supervision	148.9 (47.4)	130.6 (40.4)	116.6 (36.0)	85.0	84.2	83.6
All others	25.5 (5.7)	23.8 (5.6)	22.2 (5.3)	15.0	15.8	16.4
Total	174.3	154.3	138.8	100.0	100.0	100.0

Source: Computed from data in New York City Board of Education, Organization of the High Schools, pp. 13-14, using 94 schools.

[a] Standard deviation in parentheses.

TABLE 7

USE OF TEACHER TIME

	Mean Percent of Teacher Time		
	1974-75	1975-76	1976-77
Instruction	83.4	87.5	87.2
Guidance	7.3	5.8	5.7
Organization and administration	4.3	2.9	3.1
Supervision and curriculum	5.0	3.7	3.9

Source: Computed from data in New York City Board of Education, Organization of the High Schools, pp. 11-12, using 94 schools.

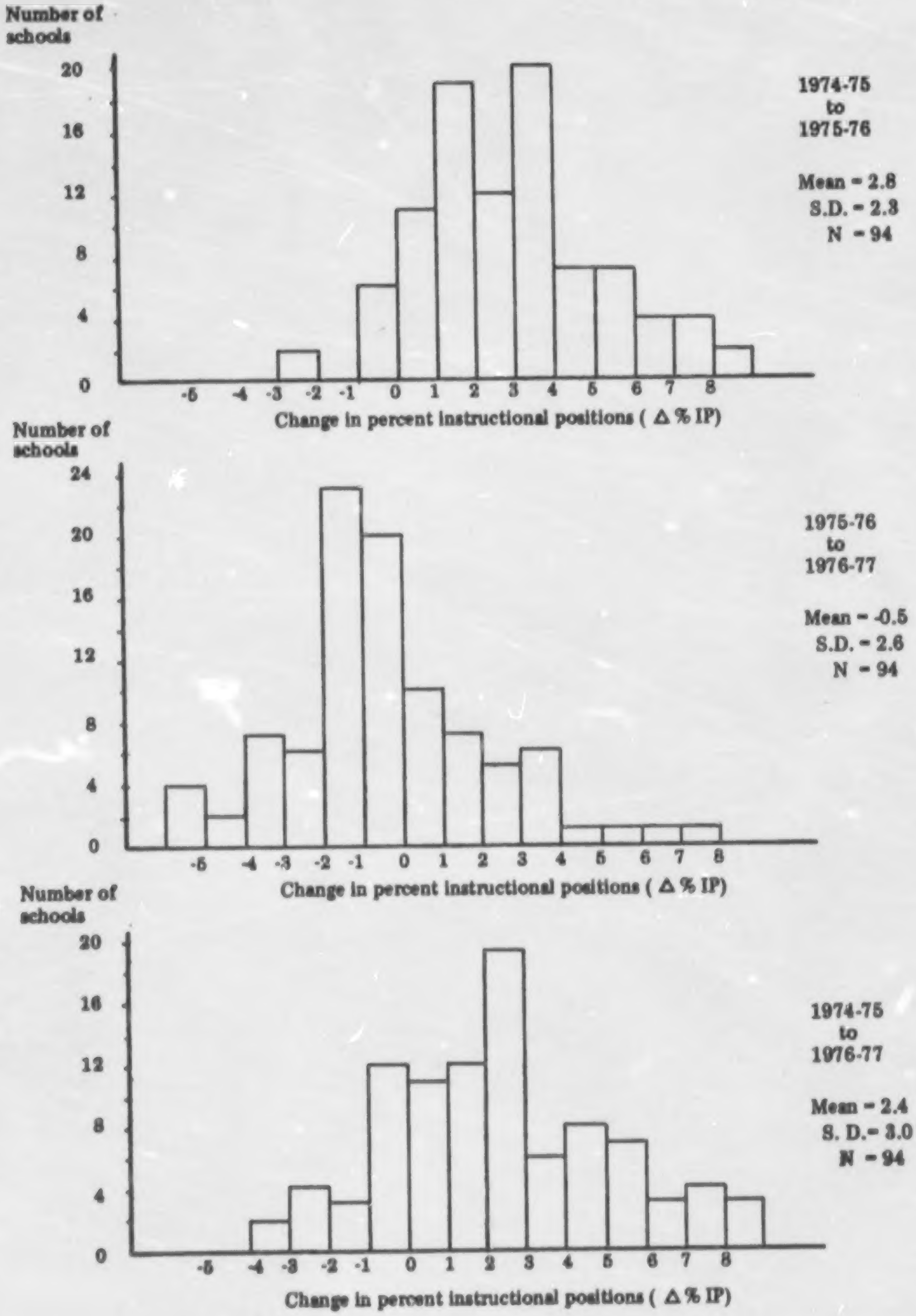
second year brought another decline in the percentage of teachers, this time from 84.2 to 83.6 (Table 6), but also a slight decline in teacher time for instruction from 87.5 percent to 87.2 percent (Table 7). The net result was no significant change in the percentage of instructional positions.

It is not suprising that the ratio of teaching staff to total staff declined even though there was a clear effort to preserve instructional services. Because of the staffing structure of schools it would have been hard to have avoided cutting proportionately more teachers than other staff. As Table 6 shows, the average school's staff was about 83 to 85 percent teaching staff. The remaining staff was composed of a relatively large number of titles, with relatively few of each type. In a school with only one principal, one secretary, and one librarian, for example, none can be cut without a complete loss of service in that area. Even when there is a preference for instructional services, large cuts are likely to result in proportionately more cuts in teaching staff. The only way to preserve instructional services under these circumstances is to increase the percentage of time used for instruction enough to compensate, which is what was done, at least the first year.

Variation among the schools. The average changes discussed above hide considerable variation. In each period of change there were schools adopting the equal cuts response (Δ% IP between -x and x), the selective cuts response to preserve instruction (Δ% IP $>$ x), and the selective cuts response to preserve administrative and support services (Δ% IP $<$ -x). The distribution is shown in Figure 1.

As noted in the discussion earlier in this chapter no clear separation exists between equal and selective cuts. Deciding what to call equal and what selective involves a somewhat arbitrary decision. Nevertheless, there is some point to defining a range for each response and associating each school with a specific response. One reason to do it is to check the consistency of the responses from year to year. If, for example, equal cuts were taken each year in fifteen schools, it is important, for the theoretical implications, to know if they were the same schools or different ones. Another reason for defining a range for equal cuts is to compare the responses concerning the mix of services with the responses concerning class structure. For example, did the schools that had no change in the mix of services also have no change in class structure.

FIGURE 1
DISTRIBUTION OF CHANGES IN MIX OF SERVICES



These problems of comparison could be partly overcome by simply comparing whether the third (or quarter, for example) of the schools closest to equal cuts were the same in both cases. However, since equal and selective cuts have been posed as representing theoretically distinct responses, it seems worthwhile to try to find a definition of each response that makes some intuitive sense. It must be kept in mind, however, that there is no important difference between two schools just across the dividing line from each other.

Determining the number of schools in which each response was adopted requires defining the range of equal cuts. This means deciding how great a deviation from a zero change in the proportion of instructional positions can be assumed still to indicate an equal preference for both instructional and administrative and support services (that is, assigning a value to what was previously called x). Since the size of the range is a matter of judgment rather than precise computation, any value chosen will be somewhat arbitrary. The results using several values were therefore computed and compared. Increasing the size of the range obviously increases the number of schools assumed to have chosen equal cuts. What is relevant is how much, and what difference it makes to the conclusions drawn about the responses.

For an idea of the plausibility of considering a value of x of 1.0, 1.5, or 2.0 to be the same as no change, what they mean for the "average" school was calculated. The mean proportion of instructional positions in 1974-75 was 70.6 percent, and the mean numbers of instructional and administrative and support staff were 124.6 and 49.7, respectively (see Table 4). If a strictly equal cuts response had been adopted, in 1975-76 the "average" school would have had 108.9 instructional positions (70.6 percent of the total positions in 1975-76, 154.3) and 45.4 administrative and support positions (154.3 - 108.9). In other words, 15.7 instructional positions and 4.3 administrative and support positions would have been cut. A shift to 69.6 percent instructional positions (that is, 70.6 percent minus 1.0 percent) would have left 107.4 instructional positions, a difference of 1.5 from the strictly equal cuts position. In the same way the ranges for x = 1.5 and x = 2.0 were calculated. The results were as follows:

	Range for "Average" School	
x =	ΔIP	ΔASP
1.0	15.7 ± 1.5	4.3 ± 1.5
1.5	15.7 ± 2.3	4.3 ± 2.3
2.0	15.7 ± 3.1	4.3 ± 3.1

Considering that the actual change in instructional positions for this "average" school would be 15.7 if a strictly equal cuts position was adopted, a value of 1.5 for x seems reasonable. In other words, a difference between cutting 15.7 and 17.2 instructional positions probably would not represent an important difference in response. On the other hand, using x equal to 2.0 would mean that there was no significant difference between cutting 18.8 and 15.7, which is more difficult to accept, especially considering the impact on administrative and support positions. It is suggested here that a conservative definition of equal cuts would use an x of 1.0 and a broader one, an x of 1.5. Any greater a deviation is probably more reasonably considered indicative of selective cuts.

The number of schools in which each response was made was determined using x equal to 1.0 and x equal to 1.5 (Table 8). In the first period of change, 1974-75 to

TABLE 8

NUMBER OF SCHOOLS ADOPTING EACH RESPONSE FOR CHANGE IN MIX OF SERVICES

	1974-75 to 1975-76		1975-76 to 1976-77		1974-75 to 1976-77	
	x = 1.0	x = 1.5	x = 1.0	x = 1.5	x = 1.0	x = 1.5
Preserve instruction ($\Delta\%\ IP > x$)	75	66	22	17	62	56
Preserve administration ($\Delta\%\ IP < -x$)	2	2	42	28	9	6
Equal cuts ($-x < \Delta\%\ IP < x$)	17	26	30	49	23	32
Number of schools	94		94		94	

1975-76, preserving instruction is clearly the dominant response regardless of the definition of equal cuts, with either seventy-five or sixty-six doing so.

In the second period of change, 1975-76 to 1976-77, however, the shift in value of x makes more of a difference. Using x equal to 1.0, administrative and support services were preserved in nearly half the schools (forty-two), with the rest more or less equally divided between the other two responses (twenty-two preserving instruction and thirty equal cuts). Increasing x to 1.5 about half seem to have had equal cuts (forty-nine), and the number preserving administrative and support services much smaller than when x is 1.0 (twenty-eight instead of forty-two).

Turning to the two year change, 1974-75 to 1976-77, selective cuts to preserve instruction is clearly dominant (sixty-two or fifty-six schools) and preserving administrative and support services obviously least significant (only nine or six schools). The problem with analyzing the second year of cuts is that the mean change, -0.45 percent, is so close to zero, and the shape of the distribution such that many schools are clustered around the mean. A small change in the value of x therefore makes a big difference.

Next the consistency of the responses in the first and second change periods was examined. As Tables 9 and 10 show, there was considerable amount of shifting. In only twenty (with x equal to 1.0) or twenty-two (with x equal to 1.5) schools was the same response adopted both years.

The correlation between the first and second changes shows a weak (r = -.286) but significant (p = .003) negative relationship. This means that the schools with large increases in the percent instructional positions one year tended to have either decreases or small increases than the other.

Class Structure

Possible responses

The major elements of a school's class structure are the number of subjects taken by the pupils and the class sizes. There is a tradeoff between the two: for a given number of classes, the more subjects taken per pupil, the larger the classes have to be. To repeat the example given in Chapter 2, in a school with two teachers, each teaching only one period per day, and two pupils, the class structure could be two pupils each taking two subjects with two pupils in each class, or each taking one subject with each pupil in a class alone. In other words, the number of subjects taken and class size are related to the number of classes per day in a school as follows:

TABLE 9

COMPARISON OF RESPONSES FOR THE TWO YEARS WITH x = 1.0

1974-75 to 1975-76	1975-76 to 1976-77			
	Preserve Instruction	Preserve Administration and Support	Equal Cuts	Total
Preserve instruction	15	36	24	75
Preserve administration and support	1	0	1	2
Equal cuts	6	6	5	17
Total	22	42	30	94

TABLE 10

COMPARISON OF RESPONSES FOR THE TWO YEARS WITH x = 1.5

1974-75 to 1975-76	1975-76 to 1976-77			
	Preserve Instruction	Preserve Administration and Support	Equal Cuts	Total
Preserve instruction	9	22	35	66
Preserve administration and support	1	0	1	2
Equal Cuts	7	6	13	26
Total	17	28	49	94

$$\text{Classes per day in a school} = \text{Number of pupils} \times \frac{\text{Average number of subjects taken per pupil}}{\text{Average class size}}$$

In the example above,

$$2 \text{ classes} = 2 \times \frac{2}{2} \text{ or } 2 \times \frac{1}{1}$$

The total number of classes per day in a school is fixed by the number of instructional positions. The standard teaching load in the New York City high schools is five classes per day. Therefore, a school with one hundred instructional positions holds five hundred classes per day. Because the budget cuts caused a reduction in the number of instructional positions, the number of classes held each day also decreased. As Table 11 shows, the average number of classes per day dropped from 623 in 1974-75 to 572 in 1975-76, and to 511 in 1976-77.

When the total number of classes is cut, the cut can be absorbed by increasing class size, decreasing the number of subjects taken by each pupil, or both. Thus the following responses are possible:

1. Selective cuts to preserve the number of subjects taken (by allowing a greater proportion of the cuts to be absorbed by increases in class size).

TABLE 11

LEVEL OF INSTRUCTIONAL SERVICES

	Mean Number			Percent Change 1974-75 to 1976-77
	1974-75	1975-76	1976-77	
Instructional positions	124.6	114.3	102.2	-18.0
Classes per day[a]	623	572	511	-18.0

Source: Computed from data in New York City Board of Education, Organization of the High Schools, pp. 11-12, using 94 schools.

[a] Classes per day = instructional positions x 5.

2. Selective cuts to preserve class size (by allowing a greater proportion of the cuts to be absorbed by decreases in the number of subjects taken).

3. Equivalent changes in the number of subjects taken and class size.

The first two alternatives represent "change" responses and the third, "no change." From an educational point of view, a preference for preserving either the number of subjects taken or class size at the expense of the other may be justified. It is therefore not possible to predict which of the selective cuts is more likely to be adopted than the other for educational reasons.

There may, however, be practical reasons for preferences. On one hand, the high school resource allocation formula contains an incentive to absorb the cut through increased class sizes. The number of staff units allocated depends on the average number of subjects taken per pupil per day, but not on the average class size. Therefore, if the number of subjects is cut the first year, the school starts with a lower base for the next year because funds are allocated according to the average number of subjects actually taken. Although it is difficult to predict how much, or even if, this affects the behavior of the school administrators, it does seem to make a response to preserve the number of subjects taken somewhat more attractive than one to preserve class size.

On the other hand, there is reason to suggest that a response to preserve class size at the expense of subjects taken may be more appealing to teachers. When the number of subjects is decreased, the students end up taking fewer classes and therefore carry the burden of the budget cut. On the other hand, if the average class size is increased, the teachers are carrying a heavier workload, teaching the same number of classes, but having more pupils in each one. If the teachers influence the decision and if they are motivated to keep their workloads down, a response to absorb the cut by decreasing the average number of subjects per pupil per day may be somewhat more likely. Or, the response to preserve the number of subjects taken may be weakened by this factor.

Operational measures of change in class structure

The class structure of a school was described by examining how the classes were scheduled--that is, the number of subjects taken and class size. The measure of subjects taken was the average number of subjects taken per pupil per day (ASPD):

$$\text{Average number of subjects per pupil per day} = \frac{\text{Pupil periods per week}}{\text{Pupils} \times 5}$$

where

$$\text{Pupil periods per week[1]} = \sum_{\text{all classes}} \left(\text{pupils enrolled in the class} \times \text{number of times the class meets per week} \right)$$

Pupils = audited register (excludes long-term absentees)

and 5 = the average number of times per week that the classes meet

Although Division of High Schools policy is to encourage pupils to take six subjects per day, the pupils within any one school carry different loads, and the average varies from school to school from about four to about seven. The average number of subjects taken per pupil per day in a school can be reduced by reducing the number of subjects some or all of the pupils are permitted to take. A decision could be made, for example, to allow ninth-graders, or all those who failed a course the year before, to take only five subjects.

It is important to keep in mind that the average number of subjects per pupil per day and the variety of courses offered are not related (unless, of course, pupils elect to take fewer subjects when the variety decreases). Variety can be reduced without affecting the average number of subjects per pupil per day. When this happens, the pupils take the same number of classes, but simply have fewer courses to choose from.

---

[1] The schedules of the individual teachers are the source of information on the number of pupil periods per week. They show how many times each class meets per week and the number enrolled in each one. The average number of subjects per pupil per day for each school is published in New York City Board of Education, Organization of the High Schools, pp. 19-20.

The other aspect of class structure, the average class size (ACS), is calculated as follows:[1]

$$\text{Average class size} = \frac{\text{Pupil periods per week}}{\text{Classes x 5}}$$

These two measures of class structure are related to the number of classes in a school as follows:[2]

$$\begin{array}{c}\text{Classes per day}\\ \text{in a school}\end{array} = \text{Pupils} \times \frac{\begin{array}{c}\text{Average number of subjects}\\ \text{per pupil per day}\end{array}}{\text{Average class size}}$$

which is the same as:

$$\frac{\begin{array}{c}\text{Classes per day}\\ \text{in a school}\end{array}}{\text{Pupils}} = \frac{\begin{array}{c}\text{Average number of subjects}\\ \text{per pupil per day}\end{array}}{\text{Average class size}}$$

---

[1] Once again, the individual teachers' schedules are the source of the information.

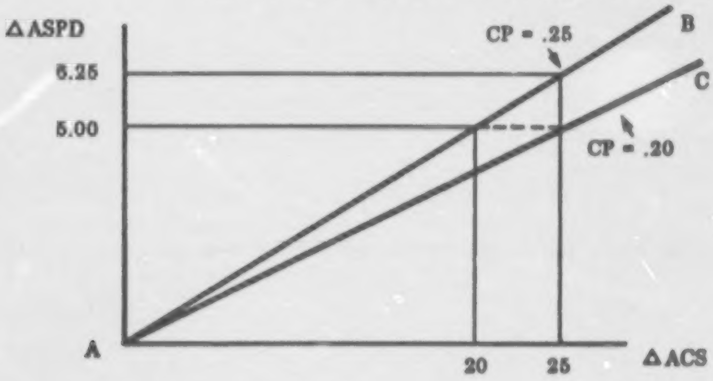
[2] Looking at how the average number of subjects per pupil per day and average class size are actually calculated also demonstrates this relationship:

$$\frac{\text{ASPD}}{\text{ACS}} = \frac{\dfrac{\text{Pupil periods per week}}{\text{Pupils x 5}}}{\dfrac{\text{Pupil periods per week}}{\text{Classes x 5}}} = \frac{\text{Classes}}{\text{Pupil}}$$

Note that the ratio of classes per day in a school to pupils does not have any practical significance. It is simply an index that combines both the average number of subjects per pupil per day and average class size. If the ratio is held constant, when the number of subjects taken per pupil goes up, the average class size goes up also, and vice versa.

For any given number of classes per day per pupil (CP), a large number of combinations of average number of subjects per pupil per day and the average class size is possible. Suppose for example, a school had 1000 pupils and 250 classes per day. The line AB in Figure 2 represents the possible combinations of ASPD and ACS for that particular CP (that is, 250/1000 = .25). In a school with a CP of .25, then, classes can be scheduled so that the pupils take an average of 5.00 subjects per day each in an average class size of 20, or 6.25 subjects in larger classes of 25, or any of a number of other combinations.

FIGURE 2
CLASS STRUCTURE ALTERNATIVES

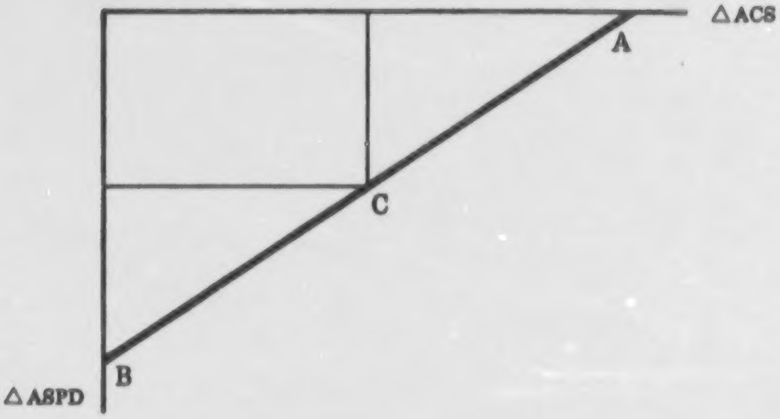


When budget cuts force a reduction in CP, another line, AC, with a smaller slope, will represent the new possible combinations of ASPD and ACS. Either ASPD can be decreased, ACS increased, or both. The more ASPD is cut, the less ACS has to be increased or the more ACS is increased, the less ASPD has to be cut. Suppose the school above had the number of classes reduced to two hundred because of budget cuts. CP would now be .20 (that is, 200/1000). In order to maintain an ASPD of 5.00, ACS would have to be increased to 25 (.20 = 5.00/ACS).

For any given decrease in CP, the possible ways to change ASPD and ACS can be determined. First, the change in ACS required if there is no change made in ASPD can be calculated. This is represented by point A in Figure 3. Next the change in ASPD required if no change in ACS is made (point B). The line joining A and B represents the combinations of ΔACS and ΔASPD that produce a particular ΔCP. The point C represents the point at which half the cut is absorbed by increasing ACS and half by decreasing ASPD. Thus AB = BC. (The much less common case of CP increasing is described at the end of this section).

FIGURE 3

THE RELATIONSHIP BETWEEN CHANGES IN ASPD AND ACS



Note that the locations of A and B will be different for each school, depending on the value of △CP.

To determine which type of change has been made in a school, the points A, B, and C can be computed for that school and the actual choice compared with them. A choice falling between C and A would be acting to preserve ASPD, while one between B and C would be preserving ACS. A school at (or very close to) C is at the point of neutrality (equal cuts).

Take for example, a school with the following class structure:

	Year	
	1	2
CP	.156	.143
ASPD	5.61	5.28
ACS	36.0	36.9

Since $CP = \frac{ASPD}{ACS}$,

if only ACS changed (that is, the choice was to be at A, where $\Delta ASPD = 0$)

$$ACS(2) = \frac{ASPD(1)}{CP(2)} = \frac{5.61}{.143} = 39.2$$

Therefore, $\Delta ACS_A = 39.2 - 3.2$ (Figure 4).

If on the other hand, only ASPD changed (that is, the choice was to be at B, where $\Delta ACS = 0$),

$$ASPD(2) = CP(2) \times ACS(1) = .143 \times 36.0 = 5.15$$

Therefore $\Delta ASPD_B = 5.15 - 5.61 = -.46$ (Figure 4).

The change at C would be:

$$\Delta ACS_C = ACS/2 = 3.2/2 = 1.6$$

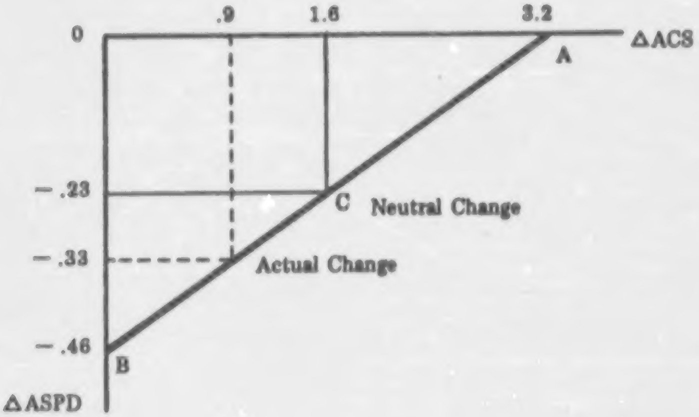
$$\Delta ASPD_C = ASPD/2 = -.46/2 = -.23.$$

The actual change for the school in the example were:

$$\Delta ACS = 36.9 - 36.0 = .9$$

$$\Delta ASPD = 5.28 - 5.61 = -.33$$

FIGURE 4
COMPARING ACTUAL AND NEUTRAL CHANGES



In this particular school, then, class size was preserved. The increase in ACS was less than, and the decrease in ASPD greater than, the school's equal cuts position.

Since a given change in CP and a given change in either ACS or ASPD fixes what the change in the other will be, either the change in ACS or in ASPD could have been used to analyze the responses. The change in ACS was chosen for this purpose here, but the change in ASPD could just as well have been used.

The actual measure used to indicate the deviation from the neutral position (point C in Figure 3) was

$$Y = \frac{(\Delta ACS_{actual} - \Delta ACS_{neutral}) \times 100}{\Delta ACS_{neutral}}$$

Y thus represents the actual deviation as a percent of the total possible deviation in that direction. In the example above,

$$Y = \frac{(.9 - 1.6) \times 100}{1.6} = -43.75,$$

which means that the average class size was increased 43.75 percent less than it would have if the neutral position had been chosen. If the actual change in class size had been 3.0,

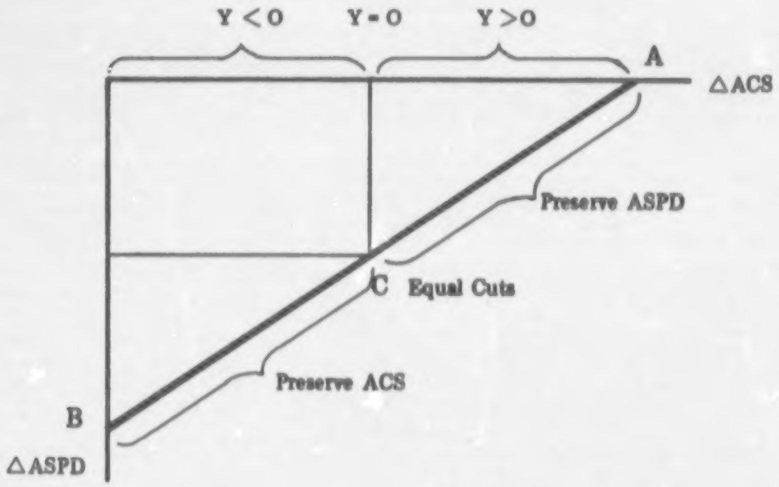
$$Y = \frac{(3.0 - 1.6) \times 100}{1.6} = 87.5.$$

This would have meant that average class size was increased 87.5 percent more than if the neutral position had been adopted.

To summarize, if a strategy to preserve ASPD is used, Y is positive, and if a strategy to preserve ACS is used, Y is negative. If strictly equal cuts are taken, Y = 0 (see Figure 5).

FIGURE 5

IDENTIFYING RESPONSES WHEN CP DECREASES

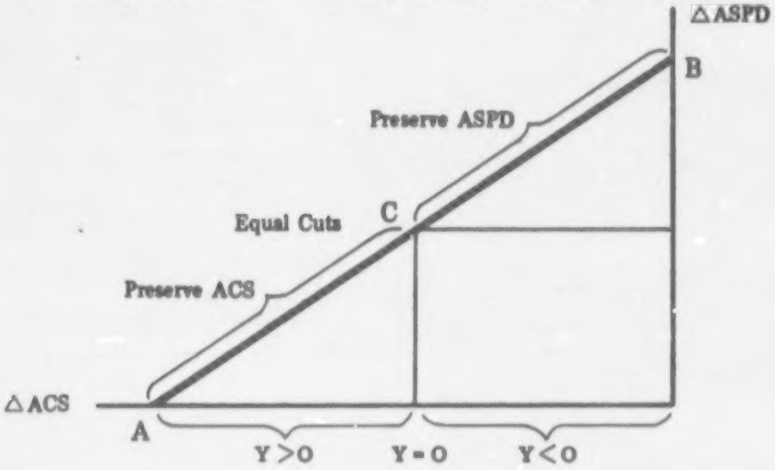


This formulation of Y was chosen to make allowance for the differences in CP among schools. Because AB will be in different positions for different schools, the total possible change in ACS (and therefore in the neutral position) will vary. The deviation from the neutral of -.7 used in the example above would have been much more significant if the neutral position had been, say, .8 rather than 1.6. The measure of Y used means that the strength of the preference for preserving ACS versus ASPD is not affected by the actual value of CP.

The above criteria for identifying responses applies only when CP declines. If CP should increase, the problem is how to allocate the increase. The range of possible combinations is shown in the figure below by AB, with C once again the neutral position.

FIGURE 6

IDENTIFYING RESPONSES WHEN CP INCREASES



The same method is used to calculate Y. The only difference is that opposite signs for Y will be associated with each response. That is, if ACS is favored, Y will be positive, and if ASPD is favored, Y will be negative. For example, if $\triangle ACS_{neutral}$ is -1.6, and $\triangle ACS_{actual}$ is -2.0, which favors ACS (because the average class size is made smaller than at the neutral position),

$$Y = \frac{(-2.0 - (-1.6)) \times 100}{-1.6} = \frac{-.4}{-1.6} = 25.0$$

Results and discussion

Changes in the schools as a group. The total change that has to be distributed between altering average class size and altering the average number of subjects taken per pupil per day is determined by the change in classes per pupil, which, as explained earlier, depends on the number of instructional positions and pupils. That is:

$$\frac{\text{Instructional positions}}{\text{Pupils}} \times 5 = \frac{\text{Classes per day}}{\text{Pupil}} = \frac{\text{Average number of subjects per pupil per day}}{\text{Average class size}}$$

This analysis treats the decision making process as if the number of instructional positions were determined first and then the class structure chosen. In theory, the order could be reversed. That is, the desired class structure determined and the number of instructional positions needed to meet this calculated. Or, the two decisions could be made simultaneously. In a period of budget reductions, the first seems intuitively more likely to approximate the order of the decisions than the second. The simultaneous approach may in fact be the most accurate, but it is also the most complex to model. Therefore, it was not used in this first attempt to understand how adaptation to the budget cuts was made. It is, however, worthy of consideration for future research.

The mean number of instructional positions declined by 18.0 percent from 1974-75 to 1976-77. During this same period enrollment stayed almost the same. Consequently the number of classes per pupil decreased from .213 in 1974-75 to .177 in 1976-77 (Table 12).

The decrease in the average number of classes per pupil was slightly greater the first year than the second (Table 13). This might at first seem to be inconsistent with the previously reported finding that the decrease in the mean number of instructional positions was slightly greater the second year than the first (-12.1 in 1975-76 to 1976-77 compared to -10.3 in 1974-75 to 1975-76: Table 5). However, the average number of pupils declined slightly in 1976 (Table 12), which would have lessened the impact of the loss of instructional positions. Thus the net result was relatively equal changes in classes per pupil both years.

As explained earlier, when the number of classes per pupil decreases, either the average number of subjects per pupil per day decreases or the average class size increases, or both. (Also possible, but less likely, are a very large increase in average class size and an increase in the number of subjects taken or a very large decrease in the number of subjects taken and a decrease in class size as well).

TABLE 12

LEVEL OF INSTRUCTIONAL SERVICES PER PUPIL

	Mean Number			Percent Change
	1974-75	1975-76	1976-77	1974-75 to 1976-77
Instructional positions	124.6	114.3	102.2	-18.0
Classes	623	572	511	-18.0
Pupils[a]	2924	2945	2886	- 1.3
Classes per day per pupil[b]	.213	.194	.177	-16.9

Source: Number of instructional positions computed from data in New York City Board of Education, Organization of the High Schools, pp. 11-14; number of classes, Table 11; number of pupils from New York City Board of Education, unpublished computer printout. Based on 94 schools.

[a] audited register (long-term absentees excluded).

[b] classes per day per pupil = (instructional positions x 5)/pupils.

TABLE 13

CHANGES IN CLASS STRUCTURE

	Mean[a]			Mean Change[b]		
	1974-75	1975-76	1976-77	1974-75 to 1975-76	1975-76 to 1976-77	1974-75 to 1976-77
Average class size	29.9 (2.4)	32.2 (2.4)	34.8 (3.0)	2.3* (12.7)	2.6* (9.6)	4.9* (15.9)
Average number of subjects per pupil per day	6.40 (.58)	6.20 (.67)	6.06 (.63)	-.20* (5.8)	-.14* (3.6)	-.34* (8.6)
Classes per pupil[c]	.216 (.03)	.194 (.03)	.176 (.03)	-.022* (14.6)	-.018* (13.6)	-.040* (24.5)

Source: Computed from data in New York City Board of Education, Organization of the High Schools, pp. 19-19A, 20-20A, using 94 schools.

[a] Standard deviations in parentheses.

[b] t-statistics in parentheses; * indicates significant at .05 level.

[c] Classes per pupil = average number of subjects per pupil per day/ average class size. The values calculated from this formula differ very slightly from those calculated by the alternative formula (see Table 12, footnote b) because of minor errors in the data.

Table 13 shows that the response to the decrease in classes per pupil was both to increase the average class size and to decrease the average number of subjects per pupil per day, with the changes significant both years. The average class size increased by 4.9 from 1974-75 to 1976-77, while the average number of subjects per pupil per day decreased by .34. Comparing the two years of cuts reveals that the change in the average number of subjects per pupil per day was a little greater the first year than the second (-.20 as opposed to -.14) and that the reverse was true for the change in average class size (2.3 the first year and 2.6 the second).

The next step in the analysis was to determine which of the three possible responses were made in the schools as a group. That is, was the cut absorbed by proportionately greater changes in average class size or average number of subjects per pupil per day, or were both equally affected? It was pointed out earlier that the sign of Y, the statistic used to determine the response followed, has a different meaning when the number of classes per pupil increase rather than decreases. Therefore, to identify the responses adopted, the schools first had to be separated according to whether the number of classes per pupil increased or decreased.

Because the budget decreased significantly, almost all the schools had decreases in the number of classes per pupil:

Number of schools for which classes per pupil	1974-75 to 1975-76	1975-76 to 1976-77	1974-75 to 1976-77
Decreased	90	88	93
Increased	4	6	1

There are, however, reasons why the number of classes per pupil could have increased in spite of the budget cuts. One is that even though the budget decreased, some schools could have received increased allocations per pupil if the proportion of educationally handicapped pupils increased greatly or if they received an unusually large allocation from the discretionary reserve. The number of classes per pupil could also have increased if the increase in the proportion of instructional positions was unusually large, large enough to compensate for the budget decrease. Finally, since classes per pupil is a ratio calculated from other variables, errors in the data for either of these in either year could mistakenly make it appear that classes per pupil had decreased.

There are not enough schools that had increased classes per pupil to analyze them as a group. Therefore the rest of this analysis is limited to those schools with a decrease in classes per pupil.

Table 14 shows the mean changes for the schools with decreased classes per pupil. They are not very different from the changes shown in Table 13 for all ninety-four schools.

Using the mean values of the average class size and average number of subjects per pupil per day, the actual changes versus the equal cuts positions were compared (see Table 15 and Figure 7). From these it can be seen that in all threeperiods the schools as a group put relatively more emphasis on increasing class size than decreasing the average number of subjects per pupil per day to adjust to the budget reductions. By computing Y it was determined that the increase in average class size from 1974-75 to 1975-76 was 49.7 percent greater than it would have been had equal cuts been adopted. In 1975-76 to 1976-77, it was 62.0 percent greater, and overall, from 1974-75 to 1976-77, 49.3 percent greater.

TABLE 14

CHANGES IN CLASS STRUCTURE: SCHOOLS WITH DECREASED CHANGES PER PUPIL FOLLOWING BUDGET CUTS

	Mean[a]			Mean Change[b]		
	1974-75	1975-76	1976-77	1974-75 to 1975-76	1975-76 to 1976-77	1974-75 to 1976-77
Average class size	29.8 (2.3)	32.0 (2.4)	34.8 (3.1)	2.5* (15.4)	2.8* (10.6)	4.9* (16.3)
Average number of subjects per pupil per day	6.4 (.59)	6.23 (.65)	6.06 (.64)	-.20* (5.5)	-.17* (4.5)	-.34* (8.6)
Classes per pupil[c]	.216 (.023)	.196 (.027)	.176 (.025)	-.023* (16.0)	-.020* (16.7)	-.041* (24.5)
Number of schools	90	88	93	90	88	93

Source: Computed from data in New York City Board of Education, Organization of the High Schools, pp. 19-19A, 20-20A.

[a] Standard deviations in parentheses.

[b] t-statistics in parentheses; * indicates significant at .05 level.

[c] Classes per pupil = average number of subjects per pupil per day/average class size.

TABLE 15

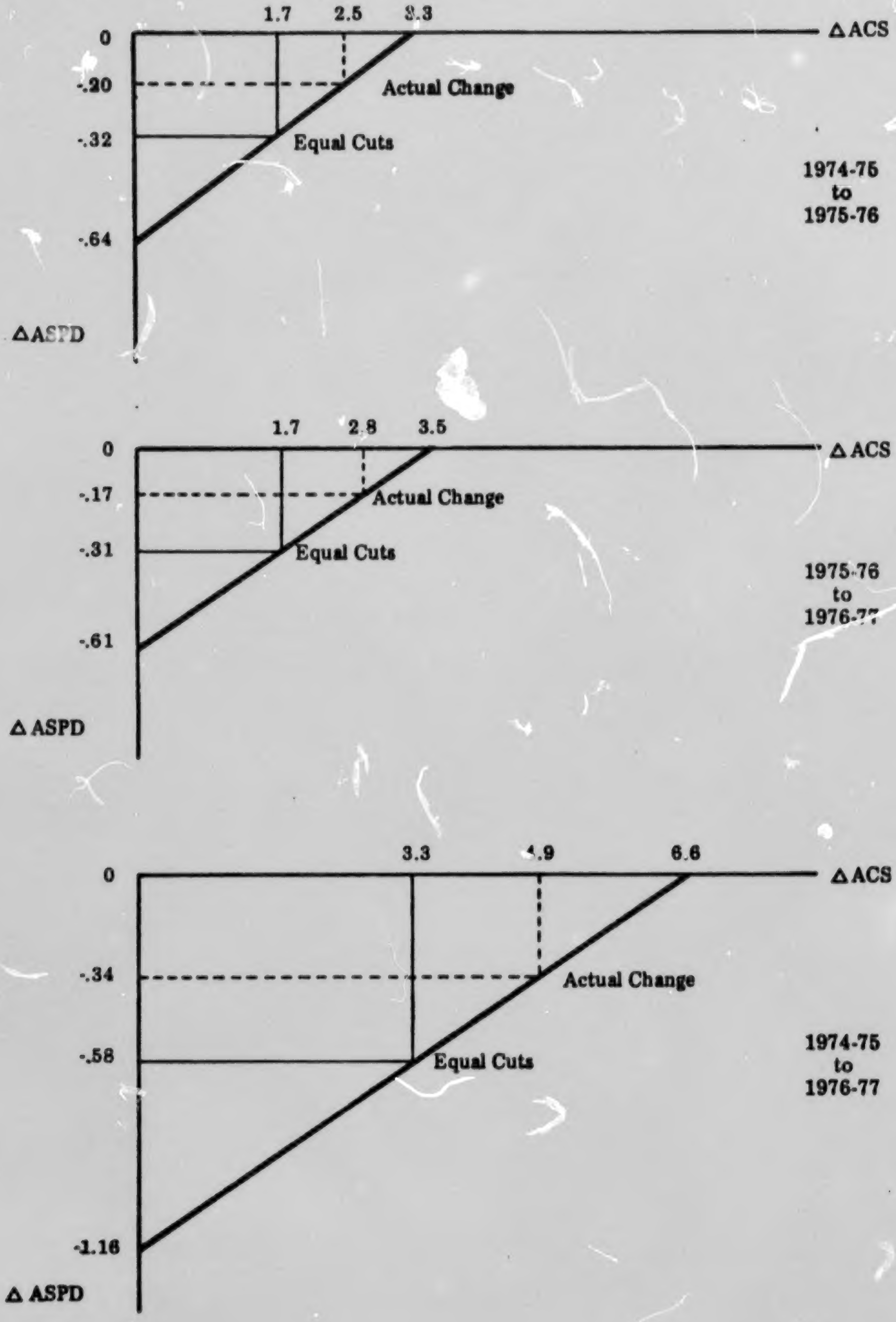
CALCULATIONS TO COMPUTE EQUAL CUTS POSITION[a]

	Actual			If Total Cut Absorbed By Increased				If Equal Cuts	
	Mean		Change	ACS		ASPD			
	t_1	t_2	t_2-t_1	t_2	t_2-t_1	t_2	t_2-t_1	t_2	t_2-t_1
1974-75 to 1975-76									
ACS	29.8	32.3	2.5	33.1	3.3	29.8	0	31.4	1.7
ASPD	6.40	6.19	-.20	6.40	0	5.75	-.64	6.08	-.32
CP	.216	.193		.193		.193		.193	
N=90									
1975-76 to 1976-77									
ACS	32.0	34.8	2.8	35.5	3.5	32.0	0	33.7	1.7
ASPD	6.23	6.07	-.17	6.23	0	5.62	-.61	5.93	-.31
CP	.196	.176		.176		.176		.176	
N=88									
1974-75 to 1976-77									
ACS	29.8	34.8	4.9	36.5	6.6	29.8	0	33.2	3.3
ASPD	6.40	6.06	-.34	6.40	0	5.24	-1.16	5.82	-.58
CP	.216	.176		.176		.176		.176	
N=93									

Note: ACS = average class size; ASPD = average number of subjects per pupil per day; CP = classes per pupil; t_1 = first time period; t_2 = second time period.

[a] Numbers shown may not all be exact due to rounding.

FIGURE 7
CHANGES IN CLASS STRUCTURE FOR THE SCHOOLS AS A GROUP



Variation among the schools. As in the case of the change in the mix of services, the average change in class structure hides considerable variation among the schools. In each period of change there were schools in which an equal cuts response ($-x < Y < x$) was made, others in which selective cuts to preserve class size ($Y < -x$) were adopted, and still others in which selective cuts to preserve the number of subjects taken ($Y > x$) were chosen (see Figure 8).

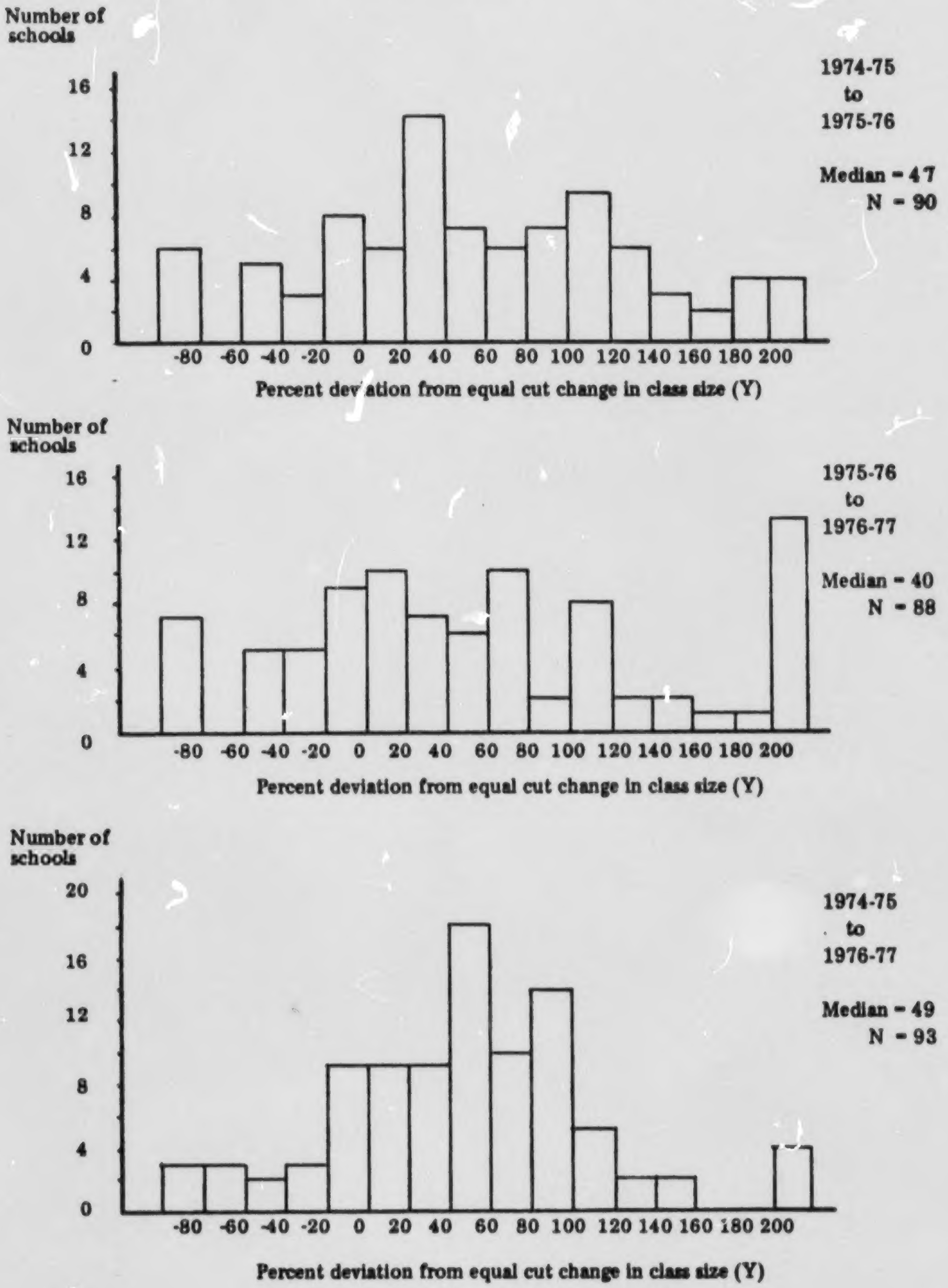
As before, defining the range of equal cuts involves some arbitrary decisions. Once again several values (using the distribution in Figure 8 as a guide) were evaluated for their implications. What these would have meant for the school with the "average" class structure in 1974-75 (average class size of 29.8 and average number of subjects per pupil per day equal to 6.40) was calculated. Given a "neutral" change in average class size of 1.7 and setting x equal to 15.0, 20.0, and 25.0 the implied actual change in average class size can be calculated:

$$\text{Since} \quad Y = \frac{(\Delta ACS_{actual} - \Delta ACS_{neutral}) \times 100}{\Delta ACS_{neutral}}$$

$$\text{then} \quad \Delta ACS_{actual} = \frac{1.7\,(Y) + 1.7\,(100)}{100}$$

FIGURE 8

DISTRIBUTION OF CHANGES IN CLASS STRUCTURE



The results were as follows:

If x =	$\triangle ACS_{actual}$	$ACS_{t=2}$	$ASPD_{t=2}$
0	1.7[1]	31.4[1]	6.08[1]
15.0	1.9	31.7	6.14
20.0	2.0	31.8	6.16
25.0	2.1	31.9	6.18

It is difficult to evaluate how great a change in average class size or average number of subjects per pupil per day indicates an important (non-zero) change. From Table 13 it can be seen that a shift in average number of subjects per pupil per day from 6.20 to 6.06 (a differance of .14) is very significant (t statistics = 3.6), as is a change in average class size of 2.3 (t statistic = 12.7). It therefore seems reasonable that a shift from 6.08 to 6.18 (see above) in average number of subjects per pupil per day and a change in average class size of 2.1, which are associated with x equal to 25.0, may be more accurately designated selective rather than equal cuts.

The number of schools for which each response was made using x equal to 15.0 and 20.0 is shown in Table 16. Which value is used does not appear to make much difference.

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[1] These values from Table 15.

TABLE 16

NUMBER OF SCHOOLS ADOPTING EACH RESPONSE FOR CHANGE IN CLASS STRUCTURE

	1974-75 to 1975-76		1975-76 to 1976-77		1974-75 to 1976-77	
	$x = 15$	$x = 20$	$x = 15$	$x = 20$	$x = 15$	$x = 20$
Preserve subjects ($Y > x$)	65	62	56	52	67	64
Reserve class size ($Y < -x$)	16	14	19	17	13	11
Equal cuts ($-x < Y < x$)	9	14	13	19	13	18
Number of schools	90	90	88	88	93	93

In the majority of schools, selective cuts to preserve subjects were made regardless of the value of x.

There was some shifting of responses from one year to the next (see Tables 17 and 18), but not as much as in the mix of services (Tables 9 and 10). Using x equal to 15.0, forty-eight schools had the same response both years, and using x equal to 20.0, forty-two did. This is not surprising since the selective cuts to preserve subjects response was so dominant both years. The correlation coefficient between the responses the two years ($r= -.15$) was not significant ($p= .08$).

Overall Patterns of Response

One aspect of the overall pattern of response that is of concern here is whether or not the school's tended to have the same response (that is, equal or selective cuts) with respect to both mix of services and class structure. Table 19 shows that the first year, fifty-two schools had selective cuts in both mix and class structure. Only twenty of these, however, had selective cuts in both again the second year. Of the remaining, ten shifted to equal cuts in both and twenty-two had equal cuts in one and selective cuts in the other. Only four schools had equal cuts in both mix and structure the first year; the number increased to fourteen the next year, however. Twenty-two schools had

TABLE 17

COMPARISON OF RESPONSES FOR THE TWO YEARS WITH x = 15

1974-75 to 1975-76	1975-76 to 1976-77			
	Preserve Subjects	Preserve Class Size	Equal Cuts	Total
Preserve subjects	42	14	10	66
Preserve class size	8	4	1	13
Equal cuts	6	1	2	9
Total	56	19	13	88

TABLE 18

COMPARISON OF RESPONSES FOR THE TWO YEARS WITH x = 20

1974-75 to 1975-76	1975-76 to 1976-77			
	Preserve Subjects	Preserve Class Size	Equal Cuts	Total
Preserve subjects	36	12	15	63
Preserve class size	7	3	1	11
Equal cuts	9	2	3	14
Total	52	17	19	88

TABLE 19

OVERALL PATTERNS OF CHANGE

1974-75 to 1975-76	1975-76 to 1976-77 Equal Cuts in Mix and Structure[a]	Selective Cuts in Mix and Structure	Different Responses in Each	Total
Equal cuts in mix and structure[a]	2	1	1	4
Selective cuts in mix and structure	10	20	22	52
Different responses in each	2	18	12	32
Total	14	39	35	88

[a] Using x = 1.5 for mix of services and x = 20 for class structure.

the same response for both mix and structure both years: two had equal cuts in both for both years, and twenty had selective cuts. In both years approximately the same number of schools had different responses with respect to mix and structure (thirty-two the first year and thirty-five the second).

The other aspect of the overall pattern of response that is of interest here is where the schools fell on the "change"-"no change" continuum. Since two aspects of domain and two periods of change were studied, there are four measures of each school's tendency for "change" or "no change". The positions of the schools on the "change"-"no change" continuum can be determined by examining how many of these times each school changed or did not change:[1]

	Number of Times Selective Cuts Adopted					
	0	1	2	3	4	Total
Number of schools	2	3	23	40	20	88
	"No Change" ←				→ "Change"	

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[1] The positions of the schools along the continuum for each aspect of domain separately are shown in Figures 1 and 8.

The majority of the schools clearly lie towards the "change" end. The twenty schools that had selective cuts four out of four possible times were the only truly "change" schools, while the two that never had selective cuts (that is, had equal cuts in both mix and class structure both years) were the only truly "no change" schools.

Overall, then, "change" as opposed to "no change" seems to be a better description of the response adopted in the New York City high schools as a group as a result of the budget cuts. However, considerable variation among the schools was found, with a number of schools having "no change" in at least one aspect of their domains. The arguments for predicting "no change" can therefore not be dismissed as unsubstantiated.

The interesting question raised by these findings is, Why did some schools have "no change" and others, "change"? This question is addressed in Chapter 4, where an attempt is made to explain the variation among the schools in terms of organizational and environmental characteristics.

CHAPTER 4

EXPLAINING THE VARIATION

The New York City high schools have many characteristics in common. They are all large public high schools, headed by principals, staffed mainly with teachers, and under the jurisdiction of the same central administration. The same formula determines their shares of available resources, and the same legal requirements concerning the use of those resources apply. Nevertheless, there was considerable variation among the schools in the response to the budget cuts (Chapter 3).

In the schools as a group, instruction was preserved at the expense of administration and support the first year, then both types of services were cut equally the following year. In both years, however, there were schools in which instruction was preserved, others in which administration and support was preserved, and still others in which both were treated equally. For the schools as a group the response with respect to class structure was to absorb more of the cut by increasing class size than by decreasing the number of subjects taken. In both years, however, there were cases of the opposite happening and also cases of both being affected equally. With respect to both the mix of services and class structure there were a number of schools in which the responses were different each year.

Why did the response differ from school to school? And why were some of the responses the second year different from the first? In spite of the similarities among the schools mentioned above, there must also have been enough differences between the circumstances surrounding the two cuts to cause some shifts in response.

The aim of this chapter is to explain as much of the observed variation as possible. Because of the large number of schools, multivariate analysis can be used to examine the causes of the variation among the schools. The differences in the responses from one year to the next cannot be analyzed as rigorously because there are only two periods of change. The conclusions about the reasons for the variation between years are therefore necessarily more speculative.

Expected Causes of Variation

Thompson argues that human action depends on (1) the characteristics of the individual (specifically, aspirations, standards and knowledge or beliefs about causation); and (2) the constraints presented by the situation.[1] Hage and

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[1] Thompson, pp. 101-2.

Dewar provide some empirical evidence to support this theory. They found that individual attitudes toward innovation on the part of powerful organization members were important determinants of the amount of innovation in the organization.[1] In addition, Hage and Aiken had previously determined that structural variables, which can be considered constraints presented by the situation, were also important.[2]

Variation in the characteristics of the decision makers and in the situations among the schools and over time can therefore be expected to cause variation in the responses to budget cuts. Precisely which aspects of administrator characteristics and the situation are expected to be important determinants of the response, how they vary among the schools, and how their influence is expected to change over time are discussed below.

Characteristics of the administrators

School administrators have some characteristics in common; they have all had similar training and are all at the head of organizations with the same basic goals and structure. Nevertheless, they are all individuals and can therefore be expected to behave differently in response to the same situation. Variation in administrator characteristics can therefore be expected to have caused some of the variation among the schools in response to the budget cuts. The important differences among administrators are discussed here.

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[1] Jerald Hage and Robert Dewar, "Elite Values Versus Organizational Structure," Administrative Science Quarterly 18 (September 1973):279-90.

[2] See Hage and Aiken.

Administrator ability and preferences. The managerial ability of the school administrators is likely to have been an important determinant of the responses to the budget cuts. The situation required a rapid response and hard choices. To collect the information needed and to develop and implement an effective plan under these circumstances requires considerable managerial skill. Since some administrators have the required skills in greater abundance than others, variation in the managerial ability of the administrators is expected to be an important cause of variation in the response among the schools.

Also expected to be determinants of the response, and thus causes of variation, are administrator characteristics likely to affect their preferences for one response as opposed to another. These would include their attitudes towards change, their beliefs about the efficacy of various educational practices, and so on.

Unfortunately no data on either managerial skills or administrator attitudes and beliefs are available. The data generally collected on principal characteristics--that is, salaries, education, and experience--are unlikely to be reliable indicators of these characteristics or useful predictors of the responses. For example, there is no reason to believe that any particular combination of education and experience would be associated with a response to preserve subjects rather than class size. The main reason why these background characteristics are not expected to be important in this case is that they tend to be so similar. That is, principals are almost always former teachers, with similar education. In organizations where the administrators come from more varied backgrounds, different backgrounds characteristics may be important causes of variation in preferences.

To obtain data on these abilities and attributes would require extensive questioning of the decision makers and those close to them, something impossible to do within the limits of this study.[1] Nevertheless, it is argued here that administrator behavior is highly likely to be influenced by the characteristics of the pupils and communities the administrators serve, and that administrator behavior can therefore be predicted to some extent from these characteristics.

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[1] Hage and Dewar, for example, used extensive interviews and tests to collect their information on administrator orientation towards change.

Pupil characteristics. One rationale for expecting pupil characteristics to have an important influence on the behavior of the administrators is that teachers and principals are professionals.[1] As such, according to the ideal model of professional behavior, they are supposed to make decisions regarding services to clients in the clients' best interests rather than their own.[2] In other words, when school administrators make decisions about what services to provide and how, their professional judgment about what would be best for the pupils ought to dictate their preferences.

Another reason for expecting pupil characteristics to affect administrator behavior is that the nature of instructional technology makes consideration of pupil characteristics mandatory. Since the "production" of an educated person requires the cooperation of that person, there will be no "product" if the nature of that person is ignored. Assuming the "product" is desired, then, pupil characteristics have to be considered.

Different kinds of pupils have different needs. The same services and ways of providing them are not appropriate for all pupils. While there is not total agreement within the profession about what different kinds of pupils need, there is a common core of general principles and beliefs. For example, many believe that slow learners need more individual attention, academically bright students need a wide variety of courses to challenge them, and so on. Therefore, when administrators are forced to implement cutbacks, how they do it should vary with the kinds of pupils they have, and it should vary predictably, based on the knowledge and beliefs of the profession about what is best for each type of pupil.

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[1] Bidwell categorizes teachers as professionals because they have specialized training, are licensed, and have at least some demonstrated expertise. See Bidwell, p. 973.

[2] Peter M. Blau and W. Richard Scott, Formal Organizations (San Francisco: Chandler, 1962), pp. 61-62.

The pupil characteristics in the New York City high schools do vary. Table 20 shows that for most of the characteristics listed there is a relatively large coefficient of variability and a wide range of values. Therefore variation in pupil characteristics can be expected to be an important cause of variation in the responses to the budget cuts.

Preferences of the community. The preferences of the community are expected to influence the response to the budget cuts at least in part because school administrators are self-interested bureaucrats as well as client-oriented professionals. Bidwell points out that school systems are to some degree bureaucracies because they have functional division of labor, definition of staff

TABLE 20

VARIATION IN PUPIL CHARACTERISTICS

1974-75

	Mean	Standard Deviation	Coefficient of Variability[a]	Range
Ethnicity				
Percent white	37.4	30.7	.82	0.4 - 96.6
Poverty				
Percent free lunch eligibles	44.2	27.6	.62	0.0 - 94.3
Stability				
Percent average daily attendance	75.1	8.1	.11	46.0 - 87.0
Turnover rate	21.9	8.6	.39	6.1 - 45.1
Achievement				
Percent 2+ years below grade in reading	50.0	24.0	.48	0.0 - 89.4

Source: Computed from data in New York City Board of Education, Profiles, pp. 78:1-78:111; using 94 schools.

[a] Standard deviation/mean.

roles as offices, hierarchical ordering of offices, and operate according to rules and procedures.[1] As bureaucrats, the principals will be guided by their own self-interests as well as their clients' interests when making decisions.[2] Therefore they can be expected to evaluate the implications of various courses of action for their own positions and choose one advantageous for them. It is argued here that it is in the interests of the administrators to take into account the preferences of the community.

School administrators are very vulnerable to parent-client pressures. Public participation in education is a well-established tradition, and school administrators cannot afford to ignore pressure from the public if they want to keep their jobs.[3]

The preferences of the community cannot be determined directly from the data available.[4] However, it is possible to speculate that parents' preferences might often coincide with these of the teachers in their roles as professionals, since both are expected to be directly related to the pupils' best interests. To a certain extent, then, there may be public pressure on the administrators to behave as client-oriented professionals rather than as self-interested bureaucrats.

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[1] Bidwell, p. 974.

[2] Downs, pp. 76-77.

[3] Bidwell, p. 1009.

[4] Actually collecting data on community preferences is even more difficult than collecting data on administrator characteristics because of the added problem of deciding who is representative of the community and therefore whose preferences to study.

One source of variation in the responses is therefore expected to be variation in the ability of the different communities to make their preferences felt. The ability and inclination of different groups to exert pressure are expected to vary with the community. The poor and uneducated, for example, are usually less able to deal effectively with the educational bureaucracy than middle and upper income people with more education.

To summarize this somewhat complicated line of reasoning: the characteristics of the community are expected to influence the ability of the community to influence the administrators, which in turn is expected to influence the strength of the tendency of the administrators to behave as client-oriented professionals rather than self-interested bureaucrats. Finally, the strength of this tendency will influence the response to the budget cuts.

The socioeconomic characteristics of the pupils (and therefore the community) do vary in terms of the percent poor (see Table 20). This variation is therefore expected to be a cause of the variation in the response to the budget cuts.

Situational constraints

The high school administrators all faced some of the same situational constraints, including the same proportional cut, the same time available for making decisions, and the same administrative and legal constraints about how they can allocate their resources. Thus the effect of variation in these variables on the responses to the budget cuts cannot be determined from this analysis. Nevertheless, certain situational constraints were different from school to school and from year to year. Variation in these can be expected to have caused some of the observed variation in the responses to the budget cuts.

School characteristics. The actual mix of services and class structure before each of the budget cuts (that is 1974-75 for the first cut and 1975-76 for the second) set an important limit on what could have been done in any particular school, especially in the short run. For example, the proportion of resources allocated to instructional services before the cut greatly affects the amount of change that can occur. In a school where 80 percent of the resources were allocated for instruction the proportion obviously could not have been increased as much as in one where only 65 percent of the resources were so used. Therefore, regardless of any priority for instruction in the 80 percent school, steps to preserve the proportion of resources allocated to instruction may be difficult because it is already close to the maximum. Similarly, in schools with very low average numbers of subjects taken per pupil per day, cuts in this area are more difficult than when the average is high.

Stated more generally, the interrelationship of structural variables in an organization gives rise to constraints when change is implemented. At the core of the structural control model of organizational change developed by Hummon, Doreian, and Teuter is the assumption that formal organizations have structures that control the development and change of organizational components.[1] Their empirical findings indicate that in the short run the actual structure of an organization places important constraints on the kinds of changes that are realizeable. While the set of possible changes is theoretically large, the existing structure makes certain ones much more probable than others.

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[1] Norman P. Hummon, Patrick Doreian, and Klaus Teuter, "A Structural Control Model of Organizational Change," American Sociological Review 40 (December 1975):819.

Because of the discretion allowed at the school level in the allocation of resources, there has always been considerable variation in how resources are allocated in the schools (see Table 21). This variation can be expected to cause variation in the response to the budget cuts.

Size, as measured by total positions, is another organizational characteristic along which schools vary (see Table 21) and which has a potential effect on the response to budget cuts. There are economies of scale in schools over at least some range of sizes because every school has to have a minimum administrative and support staff regardless of the number of pupils.

In some schools the mix of services or class structure or both were changed in response to the first budget cut (Chapter 3). The constraints posed by school characteristics were therefore different for them for each cut. This may have been an important reason why different responses to each cut were adopted in the same school.

Type of school (academic or vocational). The high schools are divided into two types, academic-comprehensive and vocational-technical. Both serve pupils who are preparing for college and those who are planning direct entry into the labor force upon graduation. The vocational schools, however, combine vocational training with a general secondary

TABLE 21

VARIATION IN ORGANIZATIONAL CHARACTERISTICS

1974-75

	Mean	Standard Deviation	Range
Percent instructional positions	70.6	4.4	58.0 - 78.9
Total positions	174.3	52.4	68.0 -321.4
Classes per pupil	.216	.032	.167 - .291
Average class size	29.9	2.4	24.9 - 35.7
Average no. subjects per pupil per day	6.40	.58	4.92 - 7.73

Source: Computed from data in New York City Board of Education, Organization of the High Schools, pp. 11-12, 19-19A, 20-20A, using 94 high schools.

education. Because of the differences in their programs, there may be systematic differences in their responses to budget reductions.

Explaining Changes in Mix of Services

Three possible responses to budget cuts have been identified: preserving instruction at the expense of administration and support, preserving administration and support at the expense of instruction, and treating both equally. On the basis of the above analysis of the expected causes of variation, specific hypotheses were developed to predict how each of the characteristics of the administrators and situation described is expected to affect the change in the allocation of resources between instruction and administration and support.

All of the expected causes of variation described above are expected to have influenced the response both years. However, it is expected that they will explain more of the variation the second year than the first because of the difference in the amount of time to respond. It is expected that the short time to plan the first response will have resulted in a less systematic response. In other words, the random element of the response is expected to be larger the first year.

Hypotheses

Six hypotheses concerning the expected causes of variation in the changes in the mix of services were developed.

Characteristics of the pupils. There are two kinds of pupil characteristics, individual and collective. Ability, motivation, and background are individual characteristics that each pupil has. (They can, of course, be aggregated to characterize a school.) Diversity and stability, on the other hand, are collective characteristics that only a group possesses.

Individual characteristics are not expected to affect the decision about how (or whether) to change the mix of services. It is expected that all administrators, in their role as professional educators, will prefer to preserve instruction at the expense of administration and support regardless of whether the pupils are of high or low ability, poor or not poor, and so on.

Some of the collective characteristics of pupils, however, are expected to influence the decision. One is the stability of the student body. Every school has a certain number of admissions and departures during the school year. The more of these there are, the more administrative and support services are needed. Additional clerical work is involved to keep track of the movement in and out of the school, and new pupils need guidance in setting up their programs. Also, stability makes it easier to plan and implement a definite response. Less administrative work is required because there are fewer changes when the characteristics of the pupils being planned for are known.

Hypothesis 1: The greater the stability of the pupil population, the greater will be the tendency to preserve instruction at the expense of administration and support.

The diversity of the student body is another collective characteristic expected to influence the response to the budget cuts. As explained in Chapter 2, diversity favors a "no change" response to budget cuts. With a diverse pupil population there is someone to defend each aspect of the instructional program, making it difficult to cut back instructional services. It is therefore suggested that any tendency to preserve instruction in a school will be enhanced by the presence of a diverse population.

Hypotheses 2: The more diverse the pupil population, the greater will be the tendency to preserve instruction.

Characteristics of the community. The principals, in their roles as bureaucrats, may want to preserve administration and support services to make their jobs easier and to protect those close to them. Evidence of a tendency to preserve supportive services during decline due to enrollment losses was found by Freeman and Hannan.[1] The pressure from the community, however, is expected to be to preserve instruction at the expense of administration and support. Principals are therefore subject to opposing pressures from two groups. Since the support of both is needed, both must be listened to. On one side are the administrative and support staff, and on the other, the community seeking a response to preserve instruction. When the pressure from the community is strong, a response to preserve instruction is more likely to be the outcome than when it is weak.

Hypothesis 3: The greater the ability of the public to influence the administrators, the greater will be the tendency to preserve instruction.

School characteristics: the mix of services. Regardless of any preference for instructional services, in all schools some resources must be allocated for administrative and support services. Thus the higher the proportion of resources allocated for instruction, the less it is possible to increase it.

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[1] Freeman and Hannan, p. 225.

Hypothesis 4: The lower the percentage of resources devoted to instruction, the greater will be the tendency to preserve instruction.

School characteristics: school size. There are economies of scale over at least some range of school sizes. A minimum administrative and support staff is required regardless of school size. Small schools are more likely than large schools to be close to that minimum. It is therefore more difficult to cut administration and support in small schools. In large schools, on the other hand, there are more options, and since administrators are expected to prefer instruction to administration and support, it is expected that administrators of large high schools will take advantage of the increased opportunities to preserve instruction.

Hypothesis 5: The larger a school is, the greater will be the tendency to preserve instruction.

Type of school (academic or vocational). In vocational schools there are needs to preserve both class size and subjects that make it very difficult to cut instruction. Pupils in vocational high schools have to take more subjects than their counterparts in academic high schools in order to obtain a general secondary education as well as vocational training. Also, in vocational schools a larger proportion of the subjects taken are shop classes, which for safety and space reasons often cannot be increased in size. Together these constraints make it harder to cut instruction in vocational high schools than academic ones. Another factor, although probably less important, is that pupils in vocational schools tend to need less guidance because their programs are more set.

Hypothesis 6: The tendency to preserve instruction will be greater in vocational high schools than in academic high schools.

Method of testing the hypotheses

Multiple regression was used to evaluate the impact of each of the factors described above on the change in the mix of services following each budget cut and for the two year change. The dependent variable, Y, is defined as follows:

$$Y = \Delta \% \, IP = \left(\frac{IP_2}{TP_2} \times 100 \right) - \left(\frac{IP_1}{TP_1} \times 100 \right)$$

where

IP = the number of instructional positions[1]

TP = the total number of positions

1,2 = successive time periods; when Y measures the response to the first budget cut, 1 represents 1974-75 and 2, 1975-76; when Y indicates the response to the second budget cut, 1 refers to 1975-76 and 2 to 1976-77. When Y measures the two year change, 1 refers to 1974-75 and 2 to 1976-77.

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[1] The variable instructional positions was described in detail in Chapter 3. The number of instructional positions is the number of full-time equivalent positions devoted to teaching.

The larger Y is, the greater the increase in the proportion of instructional positions, and thus the more pronounced the response to preserve instruction at the expense of administration and support. A negative value of Y means that the proportion of instructional positions decreased. Therefore, the smaller Y is, the stronger the tendency to preserve administration and support at the expense of instruction is. The closer Y is to zero, the more equally the two types of services were treated.

The independent variables and their operational measures are as follows:

Stability of the pupil population (TURN). Stability is measured by the turnover rate at time 1, where the turnover rate is based on the number of admissions during the school year, the number of departures, and the average daily register. The average daily register is computed by summing the daily registers (the number enrolled) and dividing by the number of school days in the year. The turnover rate is calculated as follows:

$$\text{TURN} = \frac{1}{2}\left(\frac{\text{number of admissions}}{\text{average daily register}} + \frac{\text{number of departures}}{\text{average daily register}}\right) \times 100$$

It is thus the average of the admission rate and the departure rate.[1] Note that this measure is different from the more usual indicator of stability, the net turnover, which reflects the difference between admissions and departures. Since the aim here is to define an indicator of total movement, both in and out, rather than net change, the turnover rate was computed as described above.

Diversity of the pupil population (DIV). Diversity is measured by an index of diversity at time 1, where the index was constructed as follows: schools with 50 percent or less of their pupils two or more years below grade level in reading were assigned indexes equal to the percent; those with percentages greater than fifty were assigned indexes equal to one hundred minus the percent. To illustrate this:

If the percentage of pupils two or more years below grade level in reading was:	DIV, the diversity index, was
0	0
25	25
50	50
75	25
100	0

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[1] The average was used rather the sum of the two rates simply as a scaling device.

The index therefore ranges from zero to fifty. A school with 50 percent of its pupils reading two or more years below grade level (and thus 50 percent above) has the maximum diversity, fifty. Schools with 25 percent and 75 percent below have the same index, twenty-five. An index of zero represents minimum diversity--all or none of the pupils are two or more years below grade level in reading.

This index is really a proxy for rather than a true measure of diversity. The problem is that describing diversity requires describing a distribution, which cannot be done uniquely with one number. The index of diversity used here indicates nothing about the distribution of the reading scores in a school. For example, if 40 percent of the pupils are below grade level in reading, they could all be just below or spread over a wide range. The other 60 percent could also include a wide range of abilities or could all be just barely above the cutoff point.

Ability of the community to exert influence (POOR). This variable is measured by the percent poor at time 1, where the percent poor is used here as a proxy for the ability of the community to influence the response to the budget cuts. While it is the best measure available, it has definite limitations because it is only a proxy for the true variable. While socioeconomic characteristics may be correlated with the ability to influence, they are still one step removed from the true variable. Furthermore, the percentage of poor may not be as highly correlated with the ability to influence as other socioeconomic characteristics such as the average education or income in the community.[1]

The actual measure of the percentage poor was:[2]

$$\text{POOR} = \frac{\text{number of pupils eligible for free lunches}}{\text{October 31 register}} \times 100$$

School characteristics: mix of services (PIP). The mix of services is measured by the percentage of instructional positions at time 1, where the percentage instructional positions is the number of full-time equivalent positions devoted to teaching as a percentage of the total number of positions. This variable is described in Chapter 3.

School characteristics: size (TP). School size is measured by the total number of positions at time 1.

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[1] The only other community characteristics for which data are readily available are race and borough. When these were included in the regression equations they did not have any significant explanatory power.

[2] Under U.S. Department of Agriculture regulations, pupils are eligible for free school lunches due to low family income (less than $108.46 gross weekly for a family of four, or higher if there are special hardship costs).

The size of an organization can be measured in many different ways, the most common being the level of resources, the level of output, the number of employees, and the number of clients.[1] Since the reason for including a measure of size as an independent variable here has to do with flexibility in the use of staff, the most appropriate measure of size to use here is the total number of positions.

Type of school (VOC). Vocational high schools are distinguished from academic high schools by a dummy variable. The independent variables described above are all expected to have the same kind of influence in both types of schools, but academic and vocational high schools do have different instructional programs. Therefore a dummy variable was included to separate out the effects of having different programs from the effects of the independent variables measuring pupil characteristics and pre-cut school characteristics.

Results and discussion

As Table 22 shows, approximately a third of the variation in the change in mix of services can be explained

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[1] For a discussion of the measurement of size see Kimberly, "Organizational Size," pp. 582-83.

TABLE 22

REGRESSION RESULTS: CHANGE IN MIX OF SERVICES

		Pupil Characteristics			School Characteristics			Summary Statistics		
Period	Constant	TURN	DIV	POOR	PIP	TP	VOC	R^2	Adjusted R^2	F
1974-75 to 1975-76	22.3	-.031 (1.1)	.028 (1.6)	-.014 (1.4)	-.277* (3.8)	.001 (.1)	1.59* (2.4)	.336	.290	7.3
1975-76 to 1976-77	28.0	-.082* (2.2)	-.024 (1.1)	-.015 (1.1)	-.415* (4.4)	.028* (3.5)	2.73* (3.4)	.275	.225	5.5
1974-75 to 1976-77	25.0	-.024 (.7)	.006 (.3)	-.018 (1.5)	-.355* (3.9)	.015 (1.8)	3.82* (4.6)	.367	.323	8.4

Source: Estimated from the equation: $Y = b_0 + b_1 TURN + b_2 DIV + b_3 POOR + b_4 PIP + b_5 TP + b_6 VOC$, where: Y = change in percent instructional positions; TURN = turnover rate; DIV = diversity index; POOR = percent free lunch eligibles; PIP = percent instructional positions; TP = total positions; VOC = dummy variable, vocational schools = 1; 94 observations.

Note: t-statistics in parentheses; * indicates significant at .05 level.

by the six independent variables described above.[1] A comparison of the equations for the first and second years indicates more significant variables the second year. This is consistent with the argument made earlier that with more time to plan, more factors could be taken into account in a systematic way.

It was also suggested that the random component of the response would probably be greater the first year. There is no evidence of this because actually a somewhat smaller proportion of the total variance was explained the second year (the R^2 was .275 as opposed to .336 the first year). It must be kept in mind, however, that the unexplained variation is due to variables not included as well as to random variation, and the difference in the R^2 values is not significant. It is possible that more variables were left out the second year, not that there was more random variation.

Since the coefficients of the equations look somewhat similar, a Chow test was performed to see if the difference between the equations was statistically significant.[2] An F-value of 5.8 was computed, indicating

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[1] See Table 23 for the correlation coefficients of the independent variables. They are not highly intercorrelated.

[2] Gregory C. Chow, "Tests of Equality between Sets of Coefficients in Two Linear Regressions," Econometrica 28 (July 1960):591-605.

TABLE 23

INTERRELATIONSHIP OF VARIABLES:
MIX OF SERVICES EQUATION

	Correlation Coefficients								
	Y	TURN	DIV	POOR	PIP	TP	VOC	Mean	Standard Deviation
1974-75									
Y	1.00	.03	.14	.22	-.46	-.42	.40	2.8	2.3
TURN		1.00	.02	.22	-.44	-.06	-.15	21.9	8.6
DIV			1.00	.01	.05	.01	.09	29.2	11.7
POOR				1.00	-.50	-.49	.51	44.2	27.6
PIP					1.00	.64	-.30	70.6	4.4
TP						1.00	-.63	174.3	52.4
VOC							1.00	.27	.44
1975-76									
Y	1.00	-.13	-.19	.10	-.23	.00	.21	-.45	2.6
TURN		1.00	.01	.19	-.48	-.14	-.18	20.0	7.8
DIV			1.00	-.06	.19	-.06	.12	29.9	11.3
POOR				1.00	-.45	-.52	.56	44.6	26.1
PIP					1.00	.55	-.10	73.5	3.9
TP						1.00	-.56	154.3	45.2
VOC							1.00	.27	.44

Note: See Table 22 for variable definitions.

that the null hypotheses (that is, that they are the same) can be rejected.

The equation was estimated for the two year change in addition to the two separate changes on the grounds that the mix of services after a longer period of adjustment might represent more of an equilibrium position. In other words, it would indicate more clearly the direction the schools were moving towards than a single year of change would. However, two years is not usually long enough to establish a trend, and since the average change in the dependent variable was close to zero the second year (-.45), the equation describing the two year change is not very different from the one for the first year.

It was hypothesized that the following variables would be associated with a strong tendency to preserve instruction at the expense of administration and support: high stability and diversity of the pupil population, a high ability of the community to influence the administrators, a low proportion of resources devoted to instruction, large size, and vocational school. The amount of support found for these hypotheses is discussed below.

Stability (TURN: pupil turnover). The negative coefficient for the first year means that, as expected, the higher the stability (that is, the lower the turnover), the greater was the tendency to preserve instruction. Also as expected, the coefficient for the second year had a greater absolute value. It was also significant the second year, although not the first. Perhaps the turnover rate was too subtle a factor to take into account the first year, when a quick response had to be made. That is, perhaps only after a year's experience with budget cuts was the appropriate way to take it into account widely understood.

Diversity (DIV: index based on percentage of pupils two or more years below grade level in reading). The equation for the first year suggests a relationship between diversity and the tendency to preserve instruction. The coefficient had the hypothesized sign, but was only significant at the .10 level. As expected, high diversity was associated with large increases in the percentage of instructional positions. The second year, however, the relationship was not significant.

Some speculation about what happened is possible. The first year there was no past experience in implementing cuts in the instructional programs. With high diversity, each program and policy would have had relatively equally sized constituencies. Because of the public outrage over the cuts, pressure may have been great to preserve everything, and there may have been less willingness on the part of the teachers to give up the wide range of programs needed for a diverse student body. The consequence may have been to make greater cuts in administrative and support services. The second year, the idea that some things could be sacrificed might have been more acceptable. Schools with diverse populations may have discovered they had increased the percent instructional positions too much and taken corrective action.

As pointed out earlier, however, the index of diversity used is a very rough indicator of true diversity. A better measure might make the true impact of diversity more readily discernible.

Ability to influence administrators (POOR: percent free lunch eligibles). The findings indicate a slight tendency for schools in communities with high ability to influence the decision (that is, those with a low proportion of poor) to preserve instruction, as expected. The effect was slightly more significant the first year, but in neither year was the coefficient significant at the .05 level. It could be argued that the motivation to exert influence was higher the first year because of the newness of the idea of large budget cuts for the schools. The community may have been more resigned to cuts and less inclined to participate the second year. A definite conclusion about the reasons would require more investigation of community participation in the decision making.

A possible alternative explanation for the negative relationship between the percent poor and the change in the percent of instructional positions might be that poor pupils need more administrative and support services. However, it is hard to see why this would be the case. They may need different services, but not necessarily more.

Pre-cut school characteristics: mix of services (PIP: percent instructional positions). This was by far the most significant factor both years. As expected, the smaller the proportion of resources devoted to instruction, the greater was the increase. Also as expected, the coefficient was larger and the significance greater the second year than the first.

School characteristics: size (TP: total positions). The response to the second year's cuts was as expected. That is, the greater the number of total positions, the greater the tendency to preserve instruction. The finding of no significant relationship the first year suggests there was still enough slack in the schools to allow some flexibility. The second year the schools were moving closer to the minimum required level of administrative and support services so the flexibility associated with large size became more important.

Type of school (academic or vocational) (VOC: dummy variable with vocational = 1). As expected, vocational schools had a greater tendency to preserve instruction. This was true for both years.

To summarize the findings, none of the coefficients for pupil characteristics was significant at the .05 level the first year. However, they all had the hypothesized sign. The second year, the coefficient turnover was significant, but the coefficients for the percent poor and diversity were smaller and less significant than they were the first year.

In terms of school characteristics, the percentage of instructional positions and the type of school were significant at the .05 level both years. The total number of positions was not significant the first year but was the second.

Explaining Changes in Class Structure

With a given level of resources allocated to instructional services there are many ways to organize a school's instructional program. One important decision concerns the tradeoff between class size and the number of subjects the pupils can take. With a given number of teachers the instructional program can be arranged so that the pupils take more subjects in larger classes or fewer subjects in smaller classes. In general, when budget cuts are imposed, either class sizes must be increased, the number of subjects taken decreased, or both.[1]

In Chapter 3, three broad categories of response to budget cuts were identified based on the relative emphasis on increasing class size or decreasing the number of subjects taken. Budget cuts can be absorbed more through increased class sizes (thus preserving the number of subjects taken), more through a decrease in the number of subjects taken (thus preserving the existing structure), or through equivalent changes in each.

The factors expected to influence the decision as to which of these responses to adopt were described at the beginning of this chapter: characteristics of the administrators, characteristics of the pupils and the communities, the school characteristics, and the type of school (academic or vocational). Taking each of these factors in turn (except for administrator characteristics, for which no relevant data are available, the expected impact on changes in class structure is discussed.

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[1] See Chapter 3 for a fuller explanation of this.

Where possible, specific testable hypotheses are developed. As in the case of changes in the mix of services, all of the factors are expected to have an influence both years, with a greater influence the second year.

Hypotheses

Six hypotheses concerning the expected causes of variation in the changes in class structure were developed:

Characteristics of the pupils. The individual characteristics of the pupils expected to be relevant are ability and motivation, which are expected to affect both the need to keep class size down and the need to maintain the number of subjects taken. When ability and motivation are high, pupils do not need a great deal of individual attention and are not likely to cause discipline problems. A small or moderate increase in class size in this case probably would not affect the smooth functioning of the class. On the other hand, pupils with low ability and motivation need more individual attention and are more likely to create discipline problems. A few more pupils may make it that much harder to have a smoothly functioning class.

Pupils with high ability and motivation are also likely to insist on being allowed to take the same number of subjects as in the past, while pupils with low ability and motivation are less likely to object to cuts in the number of subjects they are allowed to take.

Hypothesis 7: The greater the proportion of pupils with high ability and motivation, the greater will be the tendency to preserve the number of subjects taken by increasing class size. (Or stated another way, the greater the proportion of pupils with low ability and motivation, the greater will be the tendency to preserve class size by reducing the number of subjects taken.)

A collective characteristic of the pupils expected to be relevant to the change in class structure is the stability of the pupil population. When stability is low (that is, turnover is high), planning is difficult because the administrators do not know with any certainty the number and characteristics of the pupils they have to provide for. In this uncertain situation it is easier to reduce the number of subjects taken than to increase class size. The average number of subjects taken per pupil per day can be decreased simply by not allowing the pupils (or some subgroup, such as ninth graders, for example) to take more than a certain number of subjects. On the other hand, it is difficult to increase class sizes without some certainty about the number and types of pupils because of the risk of ending up with many classes exceeding the contractual maximum. When stability is high, the number of pupils and the courses they are likely to select can be predicted with more accuracy.

This makes it easier to absorb budget cuts by increasing average class size because classes close to the maximum can be planned for.

Hypothesis 8: The higher the stability of the pupil population (that is, the lower the turnover), the greater will be the tendency to preserve the number of subjects taken by increasing class size.

Another collective characteristic expected to affect the response is diversity. When diversity is low, many pupils will want to take the same classes, which will make it easy to fill up classes to the maximum. When diversity is high, many different kinds of classes will be needed to meet the varied demands of the pupils, and it may be difficult to fill each class to the maximum. When class size cannot be increased, the number of subjects taken must be decreased.

Hypothesis 9: The lower the diversity of the pupil population, the greater will be the tendency to preserve the number of subjects taken by increasing class size.

Characteristics of the community. In schools where they are active, parents may have an important influence on the choice between preserving class size or preserving the number of subjects taken. However, it is not possible to predict which kinds of parents would support each strategy using the data available on the characteristics of the public. Nor is it possible to predict how a high ability to influence the decision would be used. Therefore no hypotheses relating community characteristics to the change in class structure were tested.

School characteristics: number of subjects taken. When the number of subjects taken per pupil is low, it is more difficult to decrease the number than when the number taken is high.

Hypothesis 10: The smaller the number of subjects taken, the greater will be the tendency to preserve the number of subjects taken by increasing class size.

School characteristics: class size. Because the teachers' contract specifies the maximum allowable class sizes and because the physical limitations of the facilities are a consideration, at least beyond a certain point, the larger the classes are, the more difficult it is to increase class size.

Hypothesis 11: The larger the classes are, the greater will be the tendency to preserve class size. (Or, the smaller the classes are the greater will be the tendency to preserve the number of subjects taken.)

School characteristics: school size. Although school size has been discussed as an important constraint on behavior because of economies of scale, there is no reason to believe that size per se would lead to a tendency to preserve either class size or the number of subjects taken. Therefore no hypotheses linking size and change in class structure was tested.

Type of school (academic or vocational). As already indicated, pupils in vocational schools have to take more subjects than their counterparts in academic high schools in order to receive a general secondary education as well as vocational training.

Hypothesis 12: There will be a greater tendency to preserve the number of subjects taken in vocational schools than academic ones.

Method of testing the hypotheses

Multiple regression was used to evaluate the impact of each of the factors described above on the change in class structure. Only eighty-one of the ninety-four high schools in the study were included in this part of the analysis. Eliminated were those that did not have decreases in the number of classes per pupil each year[1] and three schools that had extreme values of the dependent variable.

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[1] It was explained in Chapter 3 that when classes per pupil increased rather than decreased, the sign of the dependent variable, Y, had the opposite meaning. That is, a positive Y indicated a response to preserve class size rather than subjects. The two groups, the increasers and decreasers, therefore cannot be analyzed together.

The dependent variable, Y, is defined as follows:[1]

$$Y = \frac{(\Delta ACS_{actual} - \Delta ACS_{neutral}) \times 100}{\Delta ACS_{neutral}}$$

where ΔACS_{actual} = the actual change in average class size from time 1 to time 2.

$\Delta ACS_{neutral}$ = the change in average class size that would have occurred had the budget reduction been absorbed equally by a decrease in the number of subjects taken and an increase in the average class size.

A positive value of Y means that the increase in the average class size was greater than it would have been had the cut been absorbed equally by increases in the average class size and decreases in the average number of subjects taken per pupil per day. The larger Y is, then, the more pronounced the strategy to preserve the number of subjects taken. If Y is negative it means that the increase in average class size was less than if the cut had been absorbed equally. Thus the smaller Y is, the more pronounced the strategy to preserve average class size. The closer to zero is Y, the more equally distributed the cuts.

The independent variables and their operational measures are as follows:

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[1] The reasons for using this expression as a measure of change in class structure are described in Chapter 3.

Pupil ability and motivation (ABIL). Ability and motivation are measured by the percent of pupils two or more years below grade level in reading at time 1. Pupil ability and motivation cannot be measured directly. Nevertheless it can reasonably be argued that ability and motivation are likely to be highly correlated with other pupil characteristics for which data is more readily available: achievement, attendance, and inclination to continue their formal education.

The percentage of pupils two or more years below grade level in reading is an available measure of achievement that can be used as a proxy for ability and motivation. However, even as a measure of achievement it has failings. The major problem is that it is an indicator of the proportion of students with academic problems, which is an incomplete measure of the overall level of achievement in a school. If, for example, 90 percent of the pupils in a school are two or more years below grade level in reading, then it is obvious that on the whole the school is composed of pupils with low ability. But if, say, only 20 percent are of low ability, the measure gives a very incomplete description of the ability of the pupils in that school: nothing is known about 80 percent of them. They could all be of average or above average ability or just barely above the level of the other 20 percent, for example.

Attendance is a commonly used measure of motivation, with high attendance presumed to indicate high motivation. On this basis the attendance rate of the pupils could be used as a proxy for motivation with the expectation that high attendance would be associated with a response to preserve the number of subjects taken.

However, it can also be argued that high attendance will be associated with the opposite response--that is, a tendency to preserve low average class size. If the attendance rate is high, there may be more of a need to keep average class size low because on any given day most of the pupils will be there. When attendance is low, on the other hand, large average class sizes may be more tolerable because a much smaller number will actually be present at one time.

Thus if the attendance rate is interpreted as a measure of motivation, it should be positively associated with the dependent variable. If on the other hand, it is viewed as a constraint on class size, then it should be negatively associated with the dependent variable. If the attendance rate were included as an independent variable, then only the net result of these two effects, which may cancel each other, would be seen.

An alternative available measure of pupil ability and motivation that might actually capture the effect of both is the percent of the graduating class applying for higher education. The problem with this measure, however, is that although it is probably an indicator of both ability and motivation, it does not give indication of the ability and motivation of those who do not reach the graduating class. It also does not give any indication of the proportion of pupils that reach the graduating class, and this probably varies considerably from school to school. Finally, it shows only the proportion of the pupils applying for higher education, not how many were accepted or actually went.

When the equations were estimated using the attendance rate alone and the percent applying for higher education alone, the coefficients were not significant, and when attendance and achievement were used together neither was significant.[1] Therefore achievement alone, which was significant at least one year was used in the final equation.[2]

Stability of the pupil population (TURN). Stability is measured by the turnover rate at time 1. As explained earlier, the turnover rate is the average of the admission rate and the departure rate.

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[1] This is probably because the attendance rate is quite highly correlated with achievement. The greater the percentage of pupils with low achievement, the lower the attendance rate. (The correlation coefficients were -.58 in 1974-75 and -.60 in 1975-76.)

[2] In case a relationship between ethnicity and ability and motivation should be suggested, the equation was estimated including percent white as an independent variable. It was not significant.

Diversity of the pupil population (DIV). Diversity is measured by an index of diversity at time 1. This is the same index used in the equations to explain the changes in the mix of services.

Pre-cut school characteristics: subjects taken (ASPD). This variable is the average number of subjects taken per pupil per day at time 1.

Pre-cut school characteristics: class size (CL40). This variable is the proportion of regular subject classes greater than forty at time 1. While it is reasonable to expect administrators in schools with relatively high average class sizes to be reluctant to increase them further, the most important constraints on class size are the maximums allowed by the teachers' contract. Whenever classes are increased beyond the maximum, union grievances are a threat. Therefore it is expected that when the proportion of oversized classes is high there will be a tendency to cut the number of subjects taken rather than to increase class size.

The only type of class for which the distribution of class size is available is regular subjects so this is the only type of class for which the number of oversized classes can be identified.[1] The proportion of classes greater than forty was taken as an indicator of the seriousness of the problem of oversized classes in a school.[2]

Type of school (VOC). A dummy variable was included to take into account the differences between the two types of schools.

Results and discussion

At least some of the variation in the change in class structure can be explained by the six independent variables described above (see Table 24).[3] As predicted, a greater proportion could be explained the second year than the first. The coefficients of the equations were quite different the second year, with some even having a different sign.

It was hypothesized above that the following characteristics would be associated with a tendency to preserve the number of subjects taken at the expense of class size: a large proportion of pupils with high ability and motivation, high stability and low diversity in the pupil population, a

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[1] Regular subjects accounted for 76 percent of the average pupil's class load in 1974-75. The remainder consisted of shop, music, and physical education.

[2] When the proportion greater than thirty-four was used instead, the same relationship to the dependent variable was found, but it was weaker.

[3] See Table 25 for the correlation coefficients.

TABLE 24

REGRESSION RESULTS: CHANGE IN CLASS STRUCTURE

		Pupil Characteristics			School Characteristics			Summary Statistics		
Period	Constant	ABIL	TURN	DIV	ASPD	CL40	VOC	R^2	Adjusted R^2	F
1974-75 to 1975-76	683.4	-.16 (.2)	-4.52* (2.1)	.33 (.4)	-84.5* (2.8)	-1.64 (.3)	48.2 (1.2)	.189	.123	2.9
1975-76 to 1976-77	908.3	-2.52* (2.8)	5.23* (2.2)	-1.99 (1.7)	-134.4* (3.7)	5.11* (2.1)	186.0* (3.8)	.281	.223	4.8
1974-75 to 1976-77	533.8	-.38 (.9)	-1.47 (1.2)	-.58 (1.1)	-69.6* (4.0)	5.33 (1.9)	73.7* (3.2)	.202	.138	3.1

Source: Estimated from the equation: $Y = b_0 + b_1 ABIL + b_2 TURN + b_3 DIV + b_4 ASPD + b_5 CL40 + b_6 D$ where: Y = change in class structure; ABIL = percent 2+ years below grade in reading; TURN = turnover rate; DIV = diversity index; ASPD = average number of subjects per pupil per day; CL40 = percent subject classes greater than 40; VOC = dummy variable, vocational schools = 1. 81 observations.

Note: t-statistics in parentheses; * indicates significant at .05 level.

TABLE 25

INTERRELATIONSHIP OF VARIABLES: CLASS STRUCTURE EQUATION

	Correlation Coefficients								
	Y	ABIL	TURN	DIV	ASPD	CL40	VOC	Mean	Standard Deviation
1974-75									
Y	1.00	-.23	-.25	-.06	-.18	-.17	-.13	57.7	94.0
ABIL		1.00	.74	.19	-.08	.28	.31	48.4	24.7
TURN			1.00	.01	-.42	.34	-.09	21.0	8.5
DIV				1.00	-.01	-.11	.11	28.3	11.8
ASPD					1.00	-.07	.74	6.44	.59
CL40						1.00	-.05	1.7	2.2
VOC							1.00	.30	.46
1975-76									
Y	1.00	.08	.26	-.18	-.24	.15	.03	68.6	136.7
ABIL		1.00	.63	.12	-.29	.09	.20	49.1	23.3
TURN			1.00	.03	-.48	.08	-.14	20.0	8.0
DIV				1.00	.06	.02	.10	29.8	11.5
ASPD					1.00	-.03	.67	6.26	.64
CL40						1.00	-.12	5.4	5.8
VOC							1.00	.30	.46

Note: See Table 24 for variable definitions.

low average number of subjects taken per pupil per day, a large average class size, and vocational school.

Pupil ability and motivation (ABIL: percentage of pupils two or more years below grade level in reading. Pupil ability and motivation did not have a significant effect on the response to the first budget cuts. It is possible that each school had particular areas with slack that were obvious places to implement the first cuts. Or, perhaps the planning was simply not sophisticated enough to weigh this factor in making the decision. The second year the coefficient was significant. As expected, the greater the percent of pupils with high ability and motivation (that is, the lower the percentage two or more years below grade in reading), the greater the tendency to preserve the number of subjects taken.

Stability (TURN: pupil turnover). Both years the coefficient was significant. The first year, as expected, the greater the stability, the greater the tendency to preserve subjects. Or, stated differently, the greater the turnover rate the greater the tendency to preserve class size. It was suggested earlier that from an administrative point of view this would have been the easiest course to take in a situation of uncertainty about the number and characteristics of the pupil population. The second year, however, the opposite relationship was observed. Schools with high turnover were the ones more likely to have had subjects preserved. Perhaps this represented an "error" correction. Perhaps too large cuts in the number of subjects taken were made the first year, making any further reductions very difficult and forcing the next cut to be absorbed by increasing class size. Looking at the overall change for two years, the effect found the first year, which was the one predicted, appears to have been dominant, but only slightly.

Diversity (DIV: diversity index). Diversity does not seem to have been an important factor in determining the changes in class structure. However, the findings suggest a weak relationship between diversity and how the cuts were made in the second year (the sign of the coefficient was as hypothesized and significant at the .10 level). The number of subjects taken was less likely to be preserved in the schools with diverse populations. A more adequate measure of diversity might give more conclusive results.

School characteristics: subjects taken (ASPD: average number of subjects per pupil per day). The coefficients were significant both years. As expected, the higher the average number of subjects taken per pupil per day, the more likely that the cuts were absorbed by decreases in that variable. Or, the lower the average number of subjects per pupil per day the less likely they were to cut the number of subjects taken. Also as expected, the effect was greater the second year.

Existing school characteristics: class size (CL40; percentage of regular classes greater than forty). The problem of oversized classes does not seem to have resulted in efforts to try to keep class size down at the expense of the number of subjects taken. The first year, the coefficient was not significant--the number of oversized classes was not a determining factor in the response to the budget cuts. The second year, the coefficient was significant but did not have the expected sign. The greater the number of oversized classes the greater the tendency to preserve the number of subjects taken was, which was opposite to the effect predicted.

To test this effect further, other measures of class size were substituted in the equation: average class size, the proportion of classes over thirty-four, and the proportion of classes under twenty. In all cases the same effect described above was observed. This is difficult to explain.

The most logical explanation seems to be that in schools where preserving the number of subjects taken was important, the commitment to doing so was so great that the effect on oversized classes was ignored. The commitment to preserving subjects may have been great either because the pupils demanded it or because the administrators did not want to have their resources reduced even more the next year. A cut in the average number of subjects per pupil per day has a more permanent effect than an increase in the average class size because if the average number of subjects per pupil per day is reduced, so is the base for determining the next year's allocation.

It is also possible that the schools with a large proportion of oversized classes also had a large proportion of very small classes. This situation would have made it easier for the schools to combine small classes to absorb the cut, thus allowing them to preserve subjects.

Finally, another possibility is that oversized classes (although a contract violation) were only perceived as a problem and resisted by the teachers in the schools that had a large proportion of pupils with low ability and motivation.

Type of school (VOC: dummy variable with vocational schools = 1). As expected, for the second year, at least, there was a greater tendency to preserve the number of subjects taken in the vocational schools than the academic. Perhaps the first year there was enough slack that there was more choice about how to absorb the cuts, but by the second year, vocational schools were at the point where it was necessary to preserve subjects in order to provide all the necessary subjects.

To summarize the findings, the first year the coefficients for only two variables, pupil turnover and the average number of subjects taken per pupil per day, were significant at the .05 level. The second year, however, in addition to these, the coefficients for pupil ability, the number of oversized classes, and the type of school (academic or vocational) were also significant at the .05 level.

Pupil Characteristics Versus School Characteristics

The results of the two sets of regression equations described above--mix of services and class structure--suggest that school characteristics explain more of the variation in the responses to the budget cuts than pupil and community characteristics. Such a conclusion may not be warranted, however.

One reason is the relatively large amount of variation still unexplained. There is no way of knowing how much is due to administrator, pupil, and community characteristics not included in the equation, how much to omitted school characteristics, and how much was haphazard.

It is also possible that the importance of pupil characteristics was understated because of honest differences of opinion among the administrators about what is appropriate for which kinds of pupils. In other words, the administrators may have been considering pupil characteristics (which are related to their needs) in making their decisions, but because they had different ideas about what was needed, responses were different even when pupil characteristics were the same.

Finally, there is some evidence that the relationship between pupil characteristics and the response to budget cuts is more complicated than these equations indicate. Another set of equations was estimated using the mix of services (as opposed to the change in the mix), average class size, and average number of subjects per pupil per day as the dependent variables, and pupil, community, and school characteristics as independent variables. The results show that pupil characteristics are an important determinant of at least some school characteristics, which implies a recursive system (see Table 26 and 27). That is, pupil characteristics at time t determine school characteristics at time t and both determine the change in school characteristics from t to t+1.

TABLE 25

REGRESSION RESULTS: MIX OF SERVICES

		Pupil Characteristics			School Characteristics		Summary Statistics		
Period	Constant	POOR	TURN	DIV	TP	VOC	R^2	Adjusted R^2	F
1974-75	66.0	-.029* (2.2)	-.174* (4.7)	.018 (.7)	.051* (6.7)	1.23 (1.3)	.600	.578	26.4
1975-76	68.8	-.037* (2.6)	-.158* (4.1)	.063* (2.5)	.046* (5.9)	2.26* (2.6)	.568	.544	23.2

Source: Estimated from the equation $Y = b_0 + b_1\mathrm{POOR} + b_2\mathrm{TURN} + b_3\mathrm{DIV} + b_4\mathrm{TP} + b_5\mathrm{VOC}$, where Y = percent instructional positions. See Table 22 for definitions of the other variables.

Note: t-statistics in parentheses; * indicates significant at .05 level.

TABLE 27

REGRESSION RESULTS: CLASS STRUCTURE

		Pupil Characteristics				Summary Statistics		
	Constant	ABIL	TURN	DIV	VOC	R^2	Adjusted R^2	F
Average class size								
1974-75	-32.7	-.015 (1.1)	-.078* (2.0)	-.004 (.2)	-2.13* (4.2)	.424	.394	14.0
1975-76	-34.5	-.020 (1.7)	-.083* (2.4)	.032 (1.8)	-2.71* (5.7)	.465	.436	16.5
Average number of subjects per pupil per day								
1974-75	6.76	-.003 (.9)	-.019* (2.4)	-.003 (1.0)	.98 (9.6)	.682	.666	40.8
1975-76	6.63	-.009* (3.6)	-.013 (1.8)	.002 (.5)	.99* (9.8)	.660	.642	36.8

Source: Estimated from the equations $Y = b_0 + b_1 ABIL + b_2 TURN + b_3 DIV + b_4 VOC$, where Y_1 = average class size, Y_2 = average number of subjects per pupil per day. See Table 24 for definitions of other variables.

Note: t-statistics in parentheses; * indicates signifcant at .05 level.

An important implication of this relationship for this study is that the importance of pupil characteristics in shaping the response to budget cuts has been understated. To specify the relationships of these factors more clearly, a system of equations, possibly a simultaneous system, should be investigated.

CHAPTER 5

BUDGET CUTS AND DOMAIN CHANGES: THEORETICAL IMPLICATIONS OF THE FINDINGS

There were two major parts to the empirical research. In the first part the domain changes in the New York City high schools in response to budget cuts imposed for 1975-76 and 1976-77 were described and the variation among the schools identified (Chapter 3). In the second part, the variation among the schools was explained in terms of the pupil and organizational characteristics of the schools (Chapter 4).

Summary of the Findings

The major findings can be summarized as follows:

"Change" in the mix of services and class structure was the predominant response for the schools as a group. While there were reductions in the levels of both instructional services and administrative and support services, proportionately greater cuts were made in administration and support than in instruction in response to the first budget cut. The net change over the two year period was also to preserve instruction at the expense of administration and support.

In addition, while class structure changed after each budget cut, in both years increases in class size absorbed proportionately more of the cuts than did decreases in the number of subjects taken. In spite of the overall dominance of "change," however, in the schools as a group "no change" in the mix of services was the response to the second budget cut.

There was also wide variation among the schools both years. With respect to both mix of services and class structure there were schools for which the "change" response was adopted and others for which "no change" was made.

The variation among the schools in the changes in mix of services and class structure was somewhat systematic and could be at least partly explained by differences in the pupil and organizational characteristics of the schools. In explaining the variation in both mix of services and class structure, there were more statistically significant explanatory factors the second year than the first.

The rest of this chapter examines the implications of these findings. Specifically, it addresses the following questions: On the basis of the responses to the budget cuts in the New York City high schools, what can be concluded about the more general case of domain change in response to budget reductions when there has been no change in the demand for services, and about the causes of variation in responses among organizations? And, to what extent can similar findings be predicted for other school systems and other types of organizations in similar situations? Finally, since the responses have been studied in two situations, crisis and noncrisis, can anything be said about domain changes in crisis versus noncrisis situations in general?

It is important to note at the outset that the pattern of responses found in the New York City high schools cannot necessarily be expected in organizations where the population served can be changed as a way of coping with budget cuts, because changing the population served was not an option available to the New York City high schools. In organizations where it is, reducing the population served may be a major way of changing the domain to deal with reduced resources and may make the impact on the other aspects of the domain much smaller. Therefore the findings in the New York City high schools cannot be used to predict either the changes in the population served or changes in the mix of services or how they are provided for these organizations.

The New York City findings also cannot be generalized to situations where the budget cuts are either much larger or much smaller than those imposed on the New York City high schools. Much larger cuts may lead to collapse (failure to provide services), while much smaller ones may be absorbed almost unnoticed. Since all the New York City high schools received the same proportional cut, nothing could be discovered about the size range of budget cuts for which similar findings could be expected.

Domain Changes: Implications of the Findings

On the basis of the finding of "change" as the predominant response to budget cuts in the New York City high schools it can be concluded that in at least some organizations and in at least some situations, "change" will be the response to budget reductions when there has been no change in the demand for services. In other words, in addition to changes in the level of services, budget cuts will also result in changes in the mix of services and how they are provided. This implies that the difficulties involved in finding viable alternatives to the pre-cut domain and actually implementing them (see Chapter 2) can be overcome in at least some organizations and in some situations.

Because there was "no change" in the mix of services in response to the second budget cuts it can be concluded that in at least some organizations and in some situations even when there is a significant change in the level of support from the environment there will be "no change" in the mix of services. This finding also implies that in at least some organizations and in some situations a "change" response to budget cuts will be followed by "no change" if more cuts are made. A third implication of this finding is that each aspect of the domain has to be studied separately; the response with respect to one aspect of domain cannot be used to predict the response in the other.

The finding of both "change" and "no change" in the schools as a group and the finding of some schools with each response each year suggest that the arguments presented in Chapter 2 for predicting "change" and those offered for predicting "no change" both have some validity. What still must be established is the types of organizations and situations most likely to be associated with each response. The likelihood of obtaining findings similar to those reported for the New York City high schools during the fiscal crisis in other school systems and other types of organizations in similar situations is discussed here.

Other school systems

The New York City high schools have certain characteristics in common with most other large public school systems: the same general goals and basic technology, similar authority structures, and labor forces with similar training. In addition, many other school systems have strong teachers' unions and serve pupils with a wide variety of characteristics as the New York City high schools do. These similarities provide a basis for predicting responses to budget cuts similar to those made in New York City high schools for other large public school systems faced with similar kinds of budget cuts.

However, the New York City high schools also have certain characteristics that may have played an important role in causing the observed changes and that, although not necessarily unique to New York City high schools, will not be found in all other public school systems. Changes similar to those in the New York City high schools therefore may not be as likely in school systems without them. These characteristics are:

An institutional incentive favoring "change" in how services are provided. As explained in Chapter 3, the New York City high school resource allocation formula contains an incentive to change the class structure when budget cuts are imposed--specifically, to preserve the number of subjects taken at the expense of class size. This may have been an important reason why selective cuts to preserve subjects were made in New York City high schools.

In other school systems there may be different institutional incentives or none at all. Assuming that this type of institutional incentive does affect the response, the New York City high school finding of "change" for class structure can be predicted with greater confidence for schools with institutional incentives for "change." It cannot be predicted for school systems with incentives not to change class structure or with no particular incentive either way.

Allocation of resources by formula. The particular kind of "change" in the mix of services in the New York City high schools--that is, to preserve instruction as opposed to administration and support--may have been made more likely by the practice of allocating resources among the schools by formula.. In situations where cuts are implemented in a discretionary manner there may be a tendency to make greater cuts in high priority activities, especially highly visible ones, in hopes that a public outcry will lead to a restoration of the cuts. Since the reduced resources for the New York City high schools were distributed among the schools according to the same formula used before the cuts, there would have been no incentive to engage in dramatic tactics such as this. Therefore "change" to preserve the core activity may be more likely in schools where resources are allocated by formula than in schools where cutting the core activity might actually save it in the long run.

Organizational slack. The change in class structure to preserve the number of subjects taken in the New York City high schools both years may have been at least partly due to the existence of organizational slack. Because the teachers' contract specifies maximum allowable class sizes for different types of subjects, classes smaller than the limits can be considered a kind of organizational slack. Since all classes in New York City high schools were not at the maximum, selective cuts to preserve subjects (by filling up undersized classes rather than reducing the number of subjects taken) may have been chosen for the purpose of using up the slack. In school systems where there is no slack, changes in the class structure may not be as likely. Even within the New York City high schools, if cuts continue to the point where all the slack is used up (that is, all the classes at the maximum allowable size) the probability of a "change" response may be reduced, and either "no change" or "change" to preserve class size may become more likely.

A decrease in the amount of slack available may have been at least partly responsible for the shift from "change" to "no change" in the mix of services. It is possible that before the budget cuts the schools had more administrative and support services than were strictly needed, causing greater cuts in administration and support than in instruction the first year. After one set of cuts, however, it is possible that the minimum feasible level of administration and support was being approached, causing a shift to "no change."

The arguments about slack are necessarily speculative. The minimum feasible level of administrative and support services is not defined, and it is difficult to know whether undersized classes really do represent slack. In many cases there may be very good educational reasons for having classes below the maximum allowed. However, no other organizational characteristic changed between the first and second cuts. Therefore if the change in the amount of slack was not responsible for the shift from "change" to "no change," changes in the situation must have been responsible.

To summarize, the similarities among large public school systems may lead to domain changes similar to those in the New York City high schools in similar situations. However, the above discussion indicates that before predicting the same patterns of response the institutional incentives, the resource allocation procedure, and possible areas of slack must be examined. Legal constraints must also be considered; every school system has some, but they are not the same everywhere. The confidence with which responses of the type observed in the New York City high schools can be predicted for other school systems depends on how different the school systems are from the New York City high schools with respect to the characteristics described above.

Other types of organizations

In addition to the characteristics of the New York City high schools described above as possibly increasing the likelihood of "change," there are certain characteristics of schools in general that may make a "change" response more likely in schools than in some other types of organizations.

Clear priorities. A clear priority for one type of service over another may increase the probability of "change" in the mix of services following budget cuts.

In most high schools there is a relatively clear priority for basic instructional services on the part of principals (see Chapter 2). This may have been one reason why the New York City high schools had a change in the mix of services to preserve instruction at the expense of administration and support. In other types of organizations where priorities are not as clear, "change" may not be as likely a response.[1]

Services vary in terms of visibility. The preference for instruction over administration and support in the New York City high schools may have been at least partly due to the high visibility of instruction (as opposed to administration and support) that exists in all schools. Cutbacks in instruction are more visible to the clients and the public than reductions in administration and support. The loss of instructional services is obvious when it means fewer subjects can be taken and classes are larger. Reduced attention to guidance or curriculum development, on the other hand, may not be immediately evident even though the long run impact may be just as serious. When the administrator is vulnerable to public pressures, as principals are, selective cuts to preserve the most visible service may be particularly likely. In types of organizations (or levels of organizations) where many services have more nearly equal visibility the probability of selective cuts may not be as high.

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[1] The level of analysis is important. Even at other levels in the schools, such as grades or departments, priorities may not be as clear as at the level analyzed. The relative preference for, say, history and mathematics may not be clear. Equal cuts may therefore be more likely at lower levels of an organization than at higher ones.

Centralized authority structure. The centralization of authority in the principal in the New York City high schools (which is common to most schools) may have been partly responsible for "change" in the mix of services and class structure. In organizations with more widely dispersed authority, the ability of participants to protect their own areas may increase the probability of "no change." Also, since each school operates as an independent unit, "change" may be easier than in cases where coordination with other organizations is required.

Flexible staff structure. The ease with which actions to preserve instruction can be made in the New York City high schools (and probably most schools) may have been partly responsible for the choice of selective cuts to preserve instruction rather than administration and support. Because many of the administrative and support functions are performed by teachers, the percentage of resources for instruction can be increased simply by sending teachers back to the classroom. Thus the shift does not involve actually changing the staff composition, but only reassigning duties. Administrators of organizations without this flexible kind of staff structure may find selective cuts more difficult to make.

The above discussion suggests that caution must be exercised in predicting "change" responses for organizations other than schools. It is possible to speculate, however, that clear priorities, services that vary in terms of visibility, a centralized authority structure, and a flexible staff structure may increase the probability of a "change" response.

Causes of Variation: Implications of the Findings

On the basis of the finding that the variation in the responses among the New York City high schools could be at least partly explained by variation in the pupil and organizational characteristics of the schools, it can be concluded that in at least some organizations in at least some situations, domain changes in response to budget cuts are not totally unpredictable, but depend to at least some extent on the characteristics of the clients and the characteristics of the organizations.

Because of the characteristics the New York City high schools have in common with other school systems and other large public organizations, it is not expected that these findings will be unique to the New York City high schools. The probability of similar findings in other school systems and in other types of organizations in situations similar to the New York City high schools' are discussed here.

Other school systems

Given the similarities among large public school systems, variation in the responses made in the individual schools due to variation in pupil and organizational characteristics can be predicted if two assumptions are made. One is that a variety of types of pupils and organizational characteristics exists. In the unlikely event that the distribution of pupil characteristics was the same in all schools in a system and that the organizations were identical, the responses would not necessarily vary. The other assumption is that the policies set by the central administration allow choices to be made at the school level. In other words, if the response to budget cuts is dictated by the central administration, obviously there cannot be variation among the schools in the responses (unless, of course, the directives were not the same for all schools).

In terms of explaining the variation, the similarities among school systems can be expected to lead to relationships between the domain changes made and pupil and organizational characteristics similar to those found in the New York City high schools--if the pre-cut domains reflect client characteristics. The fact that in the New York City high schools the domains before the cuts reflected pupil characteristics indicates that consideration of client needs is built into the New York City high schools already. In school systems where this is not the case, consideration of pupil characteristics during adaptation to budget cuts may not be as great.

Other types of organizations

In addition to the characteristics of New York City high schools described above as having favored consideration of pupil characteristics, certain characteristics of schools in general may make responsiveness to client needs and consideration of pre-cut organizational characteristics more likely than in other organizations.

Professional staff. Schools are staffed mainly with teachers (about 85 percent of the total staff) and school administrators are typically former teachers. As noted in Chapter 4, professionals have an obligation to consider the needs of their clients when making decisions affecting client welfare. In organizations not staffed by professionals, the same consideration of client needs may not be found.

Client involvement in the production process. Instructional technology revolves around the interaction between teacher and pupil. Therefore in order to "produce" an educated person, pupil characteristics have to be taken into account. While educators often disagree about what different kinds of pupils need, they do agree that the needs vary. In organizations where the clients are not directly involved in the production process, their needs may not be given as much weight.

Clients can exert pressure and are likely to do so. Clients unhappy with the services of an organization can register their dissatisfaction by trying to change things (using voice) or by withdrawing (exiting), and when clients have no alternative source for the services, they are especially likely to use voice.[1] Since most pupils have no alternative sources for the services, and since there is a tradition of public involvement in public education, changes made in response to budget cuts in schools may reflect client needs more than in other organizations. In some organizations, dissatisfied clients may just leave.

Fixed technology. The fact that there are few alternatives to the existing instructional technology, especially in the short run, suggests that the pre-cut mix of services and the class structure are bound to act as important determinants of domain changes. Organizations with more changeable technologies may be less constrained by their pre-cut mixes and structures.

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[1] Albert O. Hirschman, _Exit, Voice, and Loyalty_ (Cambridge: Harvard University Press, 1970).

From the above discussion it can be hypothesized that the tendency for domain changes in response to budget cuts to reflect client and organizational characteristics is increased in organizations with: professional staffs, client involvement in the production process, client ability and inclination to influence the decision, and a fixed technology.

Domain Change in Crisis Versus Noncrisis Situations

It was suggested in Chapter 2 that the responses in the first year were made in a crisis situation (threat to high priority values, little time to respond, and unexpected), while the second year they were not (there was more time to respond and the cuts were expected). There were also differences in the responses in the two years. In terms of mix of services, "change" was the response the first year and "no change" the second. In explaining the variation, there were more significant explanatory variables the second year than the first. Can it be concluded that the differences in the response were due to the crisis/noncrisis difference in the situation? If so, it could be hypothesized that the probability of "change" is increased in crisis situations in general, while "no change" is more likely in noncrisis situations; and that responses are less predictable during crises and more predictable in noncrisis situations.

It is difficult to determine whether the differences in the responses with respect to mix of services were in fact due to the crisis/noncrisis difference. Since the budget cuts were approximately the same size both years (see Chapter 1) and the resource allocation formula was not changed, the major situational difference between the two years was the crisis/noncrisis difference. This lends support to the idea that it was responsible for the different responses. However, it is still possible that factors other than this difference caused the different response.

It was previously suggested that the shift from "change" to "no change" in the mix of services could have been because of the availability of slack the first year but not the second. It is not possible to tell from the available data how much (if any) of the shift from "change" to "no change" and of the difference in the number of factors explaining the change was due to the difference between crisis and noncrisis situations and how much (again, if any) was due to the difference in the availability of slack.

Another reason it is difficult to attribute the shift from "change" to "no change" in the mix of services to the crisis/noncrisis difference is that "change" in class structure occurred both years. There is no obvious reason why the noncrisis situation would have affected the decision about the mix of services but not about class structure. However, it is possible that the incentive in the formula to change class structure was more important in this particular case than the crisis/noncrisis difference. In that case, it would still have been possible for the crisis/noncrisis difference to have been at least partly responsible for the shift to "no change" in the mix of services.

It can be hypothesized that different responses and different explanatory variables may have been at least partly due to crisis/noncrisis situations, but it is not possible to tell for sure from the data available for this study. The crisis/noncrisis difference probably was important, but no single factor is likely to have been solely responsible for any particular response because of the complexity of the change process.

CHAPTER 6

COPING WITH BUDGET CUTS: POLICY IMPLICATIONS OF THE FINDINGS

The domain changes identified in the empirical part of the research include reductions in the level of services provided and shifts in both the mix of services and the class structure. From a policy point of view it is important to know what the impact of the reduction of services has been and whether or not the shifts in mix and class structure were appropriate. If some schools have been hurt more than others by the cuts, or if in some schools inappropriate shifts have been made, intervention from the central administration may be needed. This chapter evaluates, to the extent possible with the data available, the need for such intervention and identifies the ways it could be done.

Impact of the Service Reductions

As a result of the budget cuts, there was a decline in the level of both administrative and support services and instructional services. Ideally the impact of these service reductions should be measured in terms of the changes in output. However, instructional services have multiple outputs, many of which cannot be measured. Changes in the most commonly used output measure, pupil scores on standardized achievement tests, would not be a reliable indicator of the impact of domain changes following budget cuts. In addition to the usual problems of measuring achievement--its multidimensional nature and the unreliability of the instruments used to measure it--there are other difficulties.

One is related to the timing of the effects of domain changes on achievement. It may take several years for them to appear, and it is difficult to predict when it will be. To further complicate the process of identifying the effects, the impact of the loss of some services may be felt sooner than others. The effects of the decline in instructional services, for example, may show up more quickly than the effects of the loss of administrative and support services.

Another problem is the difficulty in separating out the effects of domain changes from other causes of fluctuations in achievement. For example, the disruption of organizational processes and the loss of many familiar teachers as a result of budget cuts could cause at least short term variations in achievement. Fluctuations could also occur for reasons unrelated to budget cuts. Since education is a cumulative process, any changes observed in the years immediately following the budget cuts could be due to program changes implemented several years earlier, and any change that is reversed within a few years may have no long run effect.

Although the impact of the service reductions on output cannot be measured, the seriousness of the reductions in terms of input standards can be evaluated for instructional services. (No comparable input standards exist for administration and support.)

The Division of High School's policy is to encourage all pupils to take at least six subjects per day. Not all pupils elect to do so, but since the allocation formula distributes more resources to schools where pupils take more subjects, there was no reason before the budget cuts to discourage pupils from taking six or more. Therefore, when the average for a school was less than six before the budget cuts, it was because the pupils had chosen to take fewer subjects. When the budget cuts were imposed, adaptation was made in some schools by not permitting (or at least not encouraging) some pupils to take a full load.

Table 28 shows the average number of subjects taken per pupil per day each year and the number of schools with averages below six. While the citywide average was still above six (although barely) in 1976-77, approximately half the schools had averages below six, almost twice as many as did in 1974-75. While it is difficult to determine

TABLE 28

IMPACT OF BUDGET CUTS ON NUMBER OF SUBJECTS TAKEN AND CLASS SIZE

	Mean		
	1974-75	1975-76	1976-77
Average number of subjects per pupil per day (ASPD)	6.40 (.58)	6.20 (.67)	6.06 (.63)
No. schools with ASPD less than 6.00	25	36	46
Average class size (ACS)	29.9 (2.4)	32.2 (2.4)	34.8 (3.0)
No. schools with ACS greater than 34.0	2	24	59
No. schools with ASPD less than 6.00 and ACS greater than 34.0	0	6	33
Percent regular subject classes greater than 34	12.8	29.3	46.2

Source: Derived from Board of Education, Organization of the High Schools, pp. 19-19A, 20-20A, 21-22. Based on 94 schools; standard deviations in parentheses.

exactly what this means for the quality of education, especially since no measure of the change in variety of subjects offered is available, it is clear that the Division of High School's standards are not being met in a substantial proportion of the schools and that as more cuts are made, the situation grows worse.

Increased class size also represents a serious problem. The maximum class sizes allowed by the teachers' contract are twenty-eight for shop classes, thirty-four for regular subjects, and fifty for music and physical education. As Table 28 shows, the average class size for all classes was over thirty-four by 1976-77. The exact significance of this is hard to determine because this figure includes shop, music, and physical education classes as well as regular subjects. However, Table 28 also shows that by 1976-77 almost half of all regular subject classes exceeded the maximum of thirty-four.

As a whole, then, the budget reductions have had serious consequences for the schools in terms of the ability to meet input standards with respect to both the number of subjects taken and class sizes. The important implication for policy is that some schools are in more serious trouble than others. The worst-off are the thirty-three schools that by 1976-77 had an average number of subjects per pupil per day of less than 6.00 as well as an average class size greater than 34.0.

Because of the way resources are allocated the level of resources per pupil has always differred among the schools.[1] Before the budget cuts the disparities were not serious because the schools with the least resources per pupil were still able to provide an acceptable level of services. (While some schools had low average numbers of subjects per pupil per day or high average class sizes, no school had both an average number of subjects per pupil per day less than 6.00 and an average class size of more than 34.0.) Things have changed, however. The schools with the lowest per pupil resources may not be able to function adequately at current low levels (or even lower ones, if cuts continue).

This raises the issue of whether resources should be transferred from schools in better positions to those in the greatest trouble. In other words, should some minimum average number of subjects per pupil per day and maximum average class size or a minimum level of resources per pupil be guaranteed to all schools? The question is not easily answered. If further cuts were imposed over a period of time, this policy would eventually lead to an equalization of resources and identical average numbers of subjects per pupil per day and average class sizes for all the schools. This, in turn, would reduce the ability of the schools to reflect their pupils' characteristics. In the future, if cuts continue, the key policy issue could be how to balance the need to provide a minimum level of services in all schools with the need to allow for diversity.

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[1] The major reason for the differences is variation the average number of subjects taken per pupil per day. See Appendix A for a more detailed explanation.

Further investigation into the specific problems of the schools in the most serious trouble would be needed before the desirability of shifting resources could be assessed. One thing that would have to be established is the extent to which a school's difficult position is unavoidable given the low level of resources or correctable given better management techniques.

Even without a policy to transfer resources, further cuts could mean a trend toward decreasing variation among the schools as they tend towards the minimum input standards. So far, however, there is no evidence of this occurring. The standard deviations shown in Table 28 have not changed significantly. Also, the changes in response to both cuts can be at least partly explained by pupil characteristics. The response is therefore not yet completely dictated by a need to meet minimum standards. In fact, the starting average class size did not affect the response at all, and a large percentage of classes greater than thirty-four was associated with a tendency to increase class size even further (see Chapter 4).

This indicates that decreased variation among the schools is not yet a problem, probably at least partly because the input standards can be violated. Six subjects per day is encouraged, but are not mandated by any official regulation. The maximum class sizes can be exceeded under certain circumstances (such as not enough pupils to make two classes), and a certain number of oversized classes may be tolerated by the teachers when the alternative is more lost jobs.

Appropriateness of the Shifts

The domain changes involved a shift in the mix of services and in class structure as well as reduction in the level of services. One difficulty in evaluating the appropriateness of the shifts is that appropriateness has value connotations. That is, what teachers consider appropriate may differ from what pupils consider appropriate. Nevertheless, it seems reasonable to predict that even though they may disagree on the particulars, most would agree that appropriateness has to be evaluated in light of the pupil characteristics and the organizational characteristics of the schools at the time the cuts were imposed.

Because pupils have different needs and the pre-cut organizational characteristics impose different constraints, no one shift would be appropriate for all schools.

Looking at the schools as a group, the fact that at least some of the variation in the responses to the budget cuts among the schools could be explained using regression analysis indicates that the responses were not totally haphazard (see Chapter 4). Instead, the responses depended on the pre-cut characteristics of the schools and on the pupil and community characteristics, which can be taken as evidence that on the whole the responses were appropriate.

Assessing the appropriateness of the response of any individual school, however, is much more difficult. The actual response could be compared with the one predicted by the regression equation, but the meaning of the discrepancy would not be easy to interpret. One problem is that the regression line is based on actual behavior and as such does not indicate the most appropriate behavior in a normative sense. Another problem is that only a portion (less than a third) of the total variation is explained by any of the regression equations. A large deviation from the predicted value would therefore not necessarily indicate an inappropriate response, but could mean that other factors, entirely appropriate, but not in the equation, were more important in shaping the response. It is therefore not possible to evaluate the appropriateness of the shifts in the mix of services and class structure for individual schools without a detailed investigation into the particular circumstances of each school.

From a policy point of view, one of the best ways of promoting appropriate responses in the absence of this information is to ensure that the resource allocation process does not encourage potentially inappropriate responses. For example, the current allocation formula, with its incentive to preserve the number of subjects taken at the expense of class size has at least the potential of promoting inappropriate responses. It will be recalled that the allocation to a school depends on the average number of subjects taken per pupil per day, but not on class size or pupil characteristics. Therefore if a school has a high average number of subjects per pupil per day it receives a greater allocation than a school of the same size but with a lower average number of subjects per pupil per day. If the administrators reduce the average number of subjects per pupil per day in response to budget cuts, the next year's allocation is based on this new, lower figure. If, instead, the cut is absorbed by increasing class size and maintaining the average number of subjects per pupil per day, the next year's allocation is still based on the original average number of subjects per pupil per day.

This incentive to preserve the number of subjects taken may not affect behavior when resources are stable or increasing. Then the average number of subjects per pupil per day only declines when the pupils elect fewer subjects than the year before. During periods of budgetary decline, on the other hand, the incentive to preserve the average number of subjects per pupil per day could encourage inappropriate behavior. For example, in schools with a large proportion of pupils with low ability, where small class size may be needed more than a large number of subjects, the administrators may not want to compound their losses by reducing the number of subjects taken even though that may be more appropriate from an educational point of view.

The incentive to preserve the average number of subjects per pupil per day could be counteracted by taking class size into account in the formula, or by basing the allocations on the pre-cut level of subjects taken. The implications of doing this, however, must be evaluated carefully, because counteracting this existing incentive may have undesirable consequences. Increased class size means more work for the teacher, but may represent less of a loss to pupils than a cut in the number of subjects they can take. Without an incentive to preserve the number of subjects taken, teachers may press for cuts in the number of subjects taken (which does not affect them) to avoid larger classes. (Note that the same number of jobs will be lost regardless of the type of change in class structure.)

What is clear from this analysis is that the resource allocation procedures that work adequately during periods of budgetary stability or growth do not necessarily serve in periods of decline. This chapter has suggested changes that should be considered, but additional data and analysis would be needed before specific recommendations could be made.

CHAPTER 7

SUMMARY AND CONCLUSIONS

The overall aim of the research was to examine how the problem of reduced resources is dealt with in large, public organizations, especially when there has been no decline in the demand for services. The focus chosen was changes made in organizational domain (services provided, population served, and technology used). The site of the study was New York City's public high schools, which received two substantial budget cuts during New York City's fiscal crisis. The data used covered ninety-four schools for the school years 1974-75, the year before the cuts; and 1975-76 and 1976-77, the years for which cuts were made.

The major aims of the study were (1) to describe the domain changes in the schools and identify the variation among the schools, (2) to explain the variation in terms of the characteristics of the schools and their pupils, and (3) to examine the implications of the findings for theory and policy.

Theoretical Framework

When budgets are cut and no alternative source of funds is available, some domain change is unavoidable. One or more of the following must be done: the services provided reduced, the technology changed, or the population served decreased. Not all aspects of school domains can be changed when budgets are cut, however. Because the schools are public, the population served cannot be changed, and when the time to respond is short, the basic technology cannot be changed. Under these circumstances a decrease in the level of at least some services is inevitable. Changes in the mix of services and certain aspects of how they are provided are possible, but not inevitable.

Drawing on previously published research on schools as complex organizations, on organizational change, and on behavior in situations of stress, a case was made for predicting "no change" in the mix of services or class structure, and an equally convincing one for predicting "change."

The case for predicting "no change" rests on the strength of the forces inhibiting change. The prospects for significant change in an organization are inhibited by a tendency for a limited search for alternatives and by specific barriers at the implementation stage--specifically, the high cost of instituting changes and resistance from individuals. It was argued that the forces opposing change, which are strong in all organizations, are especially strong in large public schools, and are exacerbated in a situation of budget cuts and an atmosphere of crisis.

On the other hand, organizations are not impervious to change. It was argued that substantial budget cuts can be a strong enough stimulus for change in the mix of services and class structure as well as in the level of services. It was further argued that a situation of budget cuts and an atmosphere of crisis contribute to reducing the cost of change and make it easier to overcome vested interests. On this basis a "change" response was predicted.

Summary of Findings

First the actual changes made in the mix of services and class structure were examined to determine the response for the schools as a group and to identify the variation among the schools. Then the causes of the variation among the schools were examined.

Change in the mix of services

Given the two major categories of services, instruction and administration and support, three possible responses were identified: (1) selective cuts to preserve instruction (proportionately greater cuts in administration and support); (2) selective cuts to preserve administration and support (proportionately greater cuts in instruction); and (3) equal cuts in both. The operational measure used to determine which response was adopted was the change in instructional positions (full-time equivalent positions devoted exclusively to teaching) as a percentage of total positions.

The finding was that instruction and administration and support were both cut both years, but in the schools as a group, selective cuts to preserve instruction at the expense of administration and support were made in response to the first budget reduction. Instructional positions increased from 70.6 percent of all positions in 1974-75 to 73.5 percent in 1975-76 (see Table 29). The second year, equal cuts were made. The percentage of instructional positions decreased slightly from 73.5 percent to 73.0 percent (Table 29), but the shift was not statistically significant (using a t-test and .05 level of confidence). In other words, there was no significant change in the proportion of resources devoted to instruction as opposed to administration and support following the second budget cut. The net effect of the two cuts was a significant increase in the percentage of instructional positions.

The averages, however, hide considerable variation. In both years there were schools where administration and support was cut proportionately more than instruction, schools where the opposite was done, and schools where both were cut equally.

TABLE 29

SUMMARY OF CHANGE IN MIX OF SERVICES

	Mean Percent of Total Positions[a]			Mean Change[b]		
	1974-75	1975-76	1976-77	1st yr.	2nd yr.	Overall
Instruction	70.6 (4.4)	73.5 (3.9)	73.0 (4.2)	2.82* (11.8)	-0.45 (1.7)	2.37* (7.8)
Administration and support	29.4 (4.4)	26.5 (3.9)	27.0 (4.2)			

Source: Summarized from Table 4.

[a] Standard deviations in parentheses.

[b] t-statistics in parentheses; * indicates significant at .05 level.

Change in class structure

To deal with reduced resources for instruction, either class size can be increased or the number of subjects taken by the pupils decreased, or both. The following responses were therefore possible: (1) selective cuts to preserve the number of subjects taken (proportionately more of the cut absorbed by increases in class size); (2) selective cuts to preserve class size (proportionately more of the cut absorbed by decreases in the number of subjects taken); or (3) equivalent change in each so that the cuts were absorbed equally by increasing class size and decreasing the number of subjects taken.

Over the two year period, average class size was increased from 29.9 to 34.8 and the average number of subjects taken per pupil per day decreased from 6.40 to 6.06 in the schools as a group (Table 30). In response to each budget cut, relatively more emphasis was put on increasing class size than decreasing the number of subjects taken for the schools as a group. This was determined by comparing the actual changes in average class size to the changes that would have been required if the cuts were absorbed equally by increasing average class size and decreasing the number of subjects taken. Once again, the average hides considerable variation. In some schools the opposite of the above happened, and in others, class size and subjects taken were affected equally.

TABLE 30

SUMMARY OF CHANGE IN CLASS STRUCTURE

	Mean[a]			Mean Change[b]	
	1974-75	1975-76	1976-77	First Year	Second Year
Average class size	29.9 (2.4)	32.2 (2.4)	34.8 (3.0)	2.3* (12.7)	2.6* (9.6)
Average number of subjects taken per pupil per day	6.40 (.58)	6.20 (.67)	6.06 (.63)	-.20* (5.8)	-.14* (3.6)

Source: Summarized from Table 13.

[a] Standard deviations in parentheses.

[b] t-statistics in parentheses; * indicates significant at .05 level.

Causes of variation among the schools

In spite of the many characteristics the schools had in common, they differed in the characteristics of their pupils and in their organizational structures. A number of hypotheses about how pupil and organizational characteristics were expected to affect the responses were developed and tested using multiple regression analysis. The overall finding was that the observed variation in response to budget cuts was not haphazard, but varied systematically with the characteristics of the schools and the pupils. In other words, the response of a school to the reduction in resources could, to some extent at least, be predicted from the characteristics of the pupils and the schools.

The proportion of the variation in the mix of services that could be explained by variation in pupil and school characteristics was somewhat greater than the proportion of the variation in changes in class structure that could be explained. For both aspects of the domain (the mix of services and class structure) there were more significant explanatory factors the second year than the first.

It was hypothesized that the following variables would be associated with a strong tendency to preserve instruction at the expense of administration and support: high stability and diversity of the pupil population, a high ability of the community to influence the administrators, a low proportion of resources devoted to instruction, large size, and vocational school.

The first year, a low proportion of resources for instruction and vocational school were associated with a strong tendency to preserve instructional services. The second year, in addition to these, large school size and high stability were also associated with the tendency to preserve instruction.

It was hypothesized that the following characteristics would be associated with a tendency to preserve the number of subjects taken at the expense of class size: a large proportion of pupils with high ability and motivation, high stability in the pupil population, low diversity in the pupil population, a low average number of subjects taken per pupil per day, a large average class size, and vocational school.

The first year, high stability and a low average number of subjects per pupil per day were associated with a high tendency to preserve the number of subjects taken. The second year, high pupil ability and motivation, low stability, a low average number of subjects taken, a large proportion of subject classes over forty, and vocational school were associated with this tendency.

Conclusions

The findings reported above have important implications for both theory and policy. These are summarized here.

Theoretical implications of the findings

On the basis of the responses made to the budget cuts imposed on the New York City high schools during the fiscal crisis, some conclusions can be drawn about domain changes in response to budget reductions when demand does not decline. Specifically, it can be concluded that, in at least some organizations and in at least some situations:

1. "Change" in mix of services and in how they are provided will be the response.

2. "No change" in the mix of services will be the response.

3. A "change" response in the mix of services will be followed by "no change" if further cuts are made.

4. There will be a "change" response with respect to one aspect of domain and a "no change" response with respect to the other. Therefore each aspect of domain has to be studied separately; the response with respect to one aspect cannot be predicted from the response to the other.

5. Domain changes are not totally unpredictable, but are shaped to a significant extent by the characteristics of the clients and the organization. Therefore the type of change cannot be predicted for an organization without information about the characteristics of the organization and its clients.

On the basis of the characteristics of the New York City high schools and the fiscal crisis that seem likely to have produced the observed changes in domain, a number of hypotheses were suggested for testing in other settings. These are summarized in Table 31.

Policy implications of the findings

The findings described above suggest that the method of allocating resources among the schools should be re-examined, particularly if budget cuts continue. The high school personal service resource allocation formula, designed for periods of relatively stable or increasing resources, may be inadequate during periods of decline.

One reason is that some schools have been left in a worse position than others following the budget cuts. As a result of the reduction in the level of instructional services, by 1976-77 (after two budget cuts) there were thirty-three schools with average numbers of subjects per pupil per day less than the 6.00 encouraged by the central administration and with average class sizes greater than 34.0, the contractual maximum for regular subject classes.

This raises the question of whether resources should be transferred from schools in better positions to schools in the greatest trouble. The desirability of actually doing so cannot be established without detailed investigation of the particular circumstances of the worst-off schools. Before any transfers could be recommended it

TABLE 31

HYPOTHESES FOR TESTING IN OTHER SETTINGS

Hypotheses	Increased tendency hypothesized for:	
	Organizations that have	Situations that
"Change" in mix and structure	-institutional incentives for change -organizational slack -clear priorities -varied visibility of services -centralized authority -flexibiity staff structure	-have short time respond -have high threat to priority services -are unexpected
"No change" in mix	-little or no slack	-have more time to respond -are expected
Consideration of pupil characteristics	-professional staff -client involvement in the production process -clients that can exert pressure	-have more time to respond -are expected
Consideration of organizational characteristics	-fixed technology	-have more time to respond -are expected

would have to be established that the schools with both low average numbers of subjects per pupil per day and high average class sizes were in that position because of low resources, not because of inadequate planning and management.

Another reason that the allocation formula should be re-examined is that the currently used formula has an incentive to absorb cuts by preserving subjects rather than class size. This may encourage adoption of this response in some schools even when not appropriate given the pupil and organizational characteristics of those schools. It was pointed out that although there was no one "best" response for all the schools or even for an individual school, from almost any point of view a "good" response would reflect pupil and organizational characteristics. Therefore any aspect of the resource allocation procedure that could divert the decision makers from being guided by these should be reappraised. The most obvious one in the existing formula is the incentive to preserve the number of subjects taken at the expense of class size. Additional data and analysis would be needed before specific recommendations could be made.

Directions for Further Research

While this study has provided a general overview of the impact of the budget reductions on the organizational characteristics of the New York City high schools, further research on domain changes in response to budget cuts and research on the impact of the domain changes on the quality of education is needed.

Domain changes

The research reported here showed that using the concept of organizational domain as a framework, and relying exclusively on published data, it was possible to describe and at least partly explain some of the important tradeoffs made in the New York City high schools to adjust to budget reductions. The same approach and methodology can be used for further studies of domain changes in the New York City high schools and in other organizations. Some potentially useful ones are outlined here.

Domain changes in New York City high schools after 1976-77. A particularly important topic that should be investigated is the domain changes made in New York City high schools after 1976-77, the last year included in this study. Since all the data used for this study came from reports published annually, exactly the same measures of domain change and the same method of analysis could be used to describe later domain change and to explain the variation among the schools.

In 1977-78, the total number of staff units available for all the regular high schools was 14,555. This was a slight increase over the 1976-77 level of 13,828, but still below the levels for 1975-76 (15,207) and 1974-75 (17,302), as shown in Table 1.[1] An opportunity is thus available to examine what happens when resources are increased again after a period of decline. In terms of domain changes, the level of services will go up, but as during decline, the mix of services and class structure may or may not be changed. Important questions for research therefore include: When resources increase after decreasing, do mix of services and class structure change or remain the same? And, if they change, is it in the direction of the earlier, pre-cut domain, or towards a different one? What factors explain the variation among the schools? Are they the same factors that explained the variation in the responses to the budget reductions?

Since New York City's fiscal position is still not stable, fluctuations in available resources may continue for a number of years. Over the next few years, then, opportunities may be available to study domain changes in response to increasing, decreasing, and stable levels of resources. Analysis of the responses each year and the overall trend could contribute significantly to the understanding of organizational decline and change in response to changing levels of financial resources.

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[1] New York City Board of Education, Organization of the High Schools, pp. 9-10.

More detailed studies of domain changes in New York City high schools, 1974-75 to 1976-77. The research reported here could also be used as a starting point for more detailed studies of domain changes in the New York City high schools. Changes at a lower level of aggregation could be studied using the same types of measures and method of analysis, but more detailed data. For example, the tradeoffs between different types of instructional services (history, languages, and so on) could be analyzed, as could class structure by type of class (regular subjects, shop, and so on). Since all the data on the organization of the high schools comes originally from the schedule cards of the individual teachers, the analysis could be performed using many different levels of aggregation. The amount of effort the researcher is willing to devote to compiling the data in the desired form is the limiting factor.

It would also be worthwhile to reanalyze the domain changes from 1974-75 to 1976-77 using a simultaneous equation system. In Chapter 3 it was suggested that it might be more realistic to assume that decisions about mix and class structure are made simultaneously rather than sequentially (as implicitly assumed in this study). If so, a simultaneous equation system, where the variation in the changes in mix of services and class structure are determined at the same time, might provide a more accurate description of the relationship between these changes and pupil and school characteristics.

Domain changes in other settings. The approach and methodology used here could also be used to study domain changes in response to fluctuations (both increases and decreases) in the availability of resources in other organizations. In other school systems it may even be possible to use the same (or very similar) operational measures of change. Tradeoffs between instructional services and administrative and support services and between class size and the number of subjects taken are necessary in all schools.

Impact of domain changes

Ultimately the interest in not in domain changes per se, but in the impact of the budget reductions on the quality of education. Budget reductions cause domain changes, which affect pupils and staff, which in turn affects the quality of education.

The research reported here has described the first link: the effect of budget cuts on domain. From the analysis of the domain changes in the New York City high schools some of the effects on the pupils and staff can be identified. For example, for the pupils, the changes meant less individual attention (more pupils per teacher), larger classes, and fewer subjects taken. For the teachers, the domain changes meant lost jobs for some, and for the rest, more time in the classroom and less on other activities, and larger workloads (because of the increased class sizes). The specific effects were not the same everywhere, but varied from school to school depending on the characteristics of the pupils and the school.

Still to be investigated are the effects of these changes for the pupils and teachers on the quality of education. This is critically important. Unless it can be shown that budget cuts have adverse effects on the quality of education, it will be difficult to defend the schools from future budget reductions when scarce resources must be allccated among competing activities throughout the public sector.

APPENDIX A

RESOURCE ALLOCATION IN THE HIGH SCHOOLS

Resource allocation at two levels is discussed here: allocation from the Division of High Schools to the individual high schools, and allocation within the schools.

Allocation to the High Schools

Each June, general funds for personal services are allocated by formula to the individual high schools for the following school year.[1] Since the allocations are made in terms of "staff units" rather than the more usual dollars or positions, the staff unit is defined and the implications of its use discussed first; then the formula itself is described and discussed.

The staff unit

The total number of staff units available for distribution is determined by dividing the total budget dollars available by the average teacher salary.[2] For example, if $10 million were to be allocated and the average teacher salary was $19,400, the number of staff units available for distribution would be $10 million divided by $19,400, or 515 staff units.

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[1] General funds include city tax levy funds, capital funds for vocational education, and state formula grants. Not distributed through the formula are the general funds used for sabbaticals, substitutes, vacation pay, holiday pay, and sick pay. These are administered centrally.

[2] The average teacher salary was $18,035 in 1974-75; $18,973 in 1975-76; and $19,400 in 1976-77.

A teacher "costs" a school 1.0 staff units regardless of his or her actual salary. If, for example, ten staff units were allocated to a school, they could be used to budget ten teachers no matter what the salaries of the particular teachers were. Other positions use up different quantities of staff units, the amount depending on the average salaries of those positions relative to the average teacher salary. For example, if the average assistant principal salary were found to be 1.2 times the average teacher salary, an assistant principal, regardless of actual salary, would "cost" a school 1.2 staff units. Thus, to budget a secretary, less than one staff unit is needed, and more than one is needed for a principal.

This practice of allocating resources in staff units has certain advantages over the two major alternatives, dollars or positions. An advantage over using dollars is that schools with older (and therefore more highly paid) teachers are not put in the position of being able to hire fewer teachers. Salary scales are established by citywide collective bargaining agreements, and teacher assignment rules do not permit a principal to decide to replace a highly paid teacher with a lower paid one in order to save money. Thus if dollars were the unit of allocation, schools with higher paid teachers would be at a disadvantage because fewer staff members could be budgeted for a given allocation and the principal unable to do anything about it.

The allocations could, of course, be made in terms of dollars and then adjustments made to correct for variations in average salaries, but this would lead to essentially the same thing as using staff units and would be less straightforward.

The advantage of using staff units rather than specific positions as the unit of allocation is the flexibility it affords. It gives the principal the freedom to choose the type of positions. Rather than being allocated, say, one assistant principal, one clerk, and one teacher, the school receives two staff units. These can be used as desired, possibly for the above combination of positions (1.4 staff units for the assistant principal, .6 for the clerk, and 1.0 for the teacher),[1] but alternatively for 2 teachers or some other combination of staff. Under staff unit allocation, principals are encouraged to convert their allotments into the types of positions most appropriate for their particular programs.

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[1] The actual number of staff unit values for these positions is calculated each year based on their average salaries relative to the average teacher salary.

The allocation formula[1]

The number of staff units needed by each school is calculated using the high school personal service allocation formula. (Note that what is needed is not necessarily what is received.) The components of the formula are as follows:

1. Basic support services. The formula provides 20 staff units for each school for the basic administrative and support services required by all high schools regardless of size. In addition, 8 staff units per 1000 pupils are provided for registers in excess of 1000, up to a maximum of 35 units. Thus no school can receive a total of more than 55 units for basic support services.

To give an example, a school with a register of 3280 would receive 20 + (.008 x 2280) = 38.24 units. A school with a register of 5375 would receive 20 + (.008 x 4375) = 55.0 units. Thus all schools under 1000 receive 20 units, all schools of 5375 or more receive 55 units, and for the schools in between, the number received increases with the number of pupils.

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[1] This description is adapted from New York City Board of Education, Division of High Schools, "High School Personal Service Allocation Formula," unpublished.

2. Basic instruction and supervision. This part of the formula provides the teacher time for basic instruction and supervision. The amount allocated to a school depends on its register, the average number of subjects taken per day per pupil, and also on certain citywide factors: contractual class size maximums, average class size, and supervision requirements. The amount allocated to each school is:

$$\frac{1.05 \times \text{pupil register} \times \text{weighted daily pupil load}}{5 \times \text{citywide average class size}}$$

where

1.05 is a factor to provide classroom coverage for the non teaching time of assistant principals for supervision.

Pupil register is the adjusted, audited register estimated for the budget date (October 31 or March 31). This register excludes long term absentees.

Weighted daily pupil load is the average number of subjects per day expected (on the basis of past experience) to be elected by the students, weighted by the contractual class size maximums, which are different for each subject area. The weight for a regular class, which has a maximum class size of 34, is 1. For a shop class, the weight is 34/28 = 1.22. Because shop classes have a maximum class size of only 28, more than 1 unit is needed to cover 34 pupils. On the same basis, minor music and physical education classes, which have maximum class sizes of 50, are weighted at 34/50 = .68.

A school with an average number of subjects taken per pupil per day as follows:

regular subjects	5.20
shop	.23
minor music	.07
physical education	.75

would have a weighted daily pupil load of

$$5.20 + 1.22(.23) + .68(.07) + .68(.75) = 6.04.$$

Average class size is the citywide average class size in 1974-'75: 31.5. This average class size figure is still used for the formula. The average class size is multiplied by 5 because the normal daily teaching load is 5 classes. This component (5 x average class size) represents the number of pupils that can be taught per day by one teacher.

Using the data above, the amount needed by this school for instruction and supervision would be:

$$\frac{1.05\ (3280)\ (6.04)}{5\ (31.5)} = 132.07 \text{ staff units.}$$

3. Allotment for educationally handicapped pupils. This segment provides for all remedial efforts, including bilingual, reading, and mathematics programs. It depends on the number of pupils needing these programs as determined by standardized tests.

In addition to the above, a small percentage (usually about 4 percent) of available staff units are reserved to be allocated for special purposes such as optional and innovative programs requested by the principal, unanticipated register increases, and miscellaneous other needs. This portion of the resources is not distributed uniformly among the schools, but at the discretion of the Executive Director and the high school superintendents.

Each school's needs are calculated using this formula. Then the totals for the individual schools added to determine the systemwide needs. The first two components of the formula are the most important; together they account for approximately 90 percent of the staff units required (see Table 32).

The next step is to match the needs with the available staff units. If, for example, the amount available is 15 percent below the amount needed, each school's allocation is reduced 15 percent. Thus when the large budget cuts in 1975-76 and 1976-77 were imposed, all the schools were treated the same in the sense that each received the same percentage reduction. (Only the first three components described above were subject to the percentage reduction, not the discretionary portion of the allocation.)

TABLE 32

STAFF UNIT NEEDS[a]--ALL REGULAR HIGH SCHOOLS

	1974-75		1975-76		1976-77	
	No.	%	No.	%	No.	%
Basic Support	3494	19.8	3515	20.3	3550	20.6
Instruction and supervision	12,153	68.8	12,076	69.9	12,230	70.9
Remedial Programs	961	5.4	836	4.8	868	5.0
Discrete Allotment	1052	6.0	849	4.9	593	3.4
Total	17,661	100.0	17,276	100.0	17,242	100.0

Source: New York City Board of Education, Organization of the High Schools, pp. 9-10.

[a] These numbers represent the schools' needs as calculated by the formula, not the actual staff units allocated, which depends on the availability of funds.

Implications of the formula

It is important to recognize that although the allocations are based on a formula, all schools do not receive the same number of staff units per pupil. Because of the way the basic support component works, very small schools receive more staff units per pupil than very large ones.[1] In addition, the larger the average number of subjects taken per day per pupil, the larger the proportion of shop classes, and the larger the number of pupils needing remedial programs, the greater is the number of staff units per pupil.[2] Finally, the amount received from the discretionary component also varies from school to school. Consequently there is considerable variation in the number of staff units per pupil (Table 33).

Another significant feature of the formula is that, because the citywide average class size is used for all schools, the actual average class size in a school does not affect its allotment. On the other hand, the more

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[1] For example, a school with 1000 pupils receives 20/1000 = .020 staff units per pupil, while one with 6000 receives only 55/6000 = .009 staff units per pupil.

[2] Note, however, that the last two components, remedial programs and discretionary allocations accounted for only 8.4 percent of the total in 1976-77. The major source of variation in the allocations among the school is the differences in the average number of subjects per pupil per day and the proportion of shop classes.

TABLE 33

VARIATION IN ALLOCATIONS

	Mean[a]		
	1974-75	1975-76	1976-77
Staff units	180.4 (53.1)	156.4 (45.4)	141.0 (40.6)
Pupil register	3134 (1188)	3161 (1171)	3164 (1113)
Pupils per staff unit	16.9 (2.4)	19.7 (2.9)	22.1 (3.2)

Source: Computed from data in New York City Board of Education, Organization of the High Schools, pp. 1-2, 9-10; using 94 schools.

[a] Standard deviations in parentheses.

subjects taken by each pupil, the more resources the school receives, producing an incentive to have pupils take a large number of subjects if a large share of total available resources is desired. (This applies only up to a maximum of 7. No additional resources are allocated once the average number of subjects per day per pupil has reached 7.0.)

When the budget is cut, then, if the principal absorbs the cut by reducing the number of subjects taken, the next year this lower number will be the basis for the allocation for the following year. If, instead, class size is increased, the base will not be affected. Class size cannot, of course, be increased indefinitely because of the maximum class sizes specified in the teachers' contract and the physical limitations of the school buidlings.

The way in which budget reductions are made--that is, by across the board percentage reductions--also has important implications in terms of the expected responses. Since all the high schools received the same proportional cut, there would have been no reason for a school to engage in tactics designed to increase its share of the total. The responses should therefore reflect the "best" efforts to adapt to stringent budgetary conditions. There would have been no incentive to engage in dramatic tactics designed to gain a greater share of the total resources.

Resource Allocation Within the Schools

After the allocations to the schools have been made, each principal, in consultation with the school's Consultative Council and with the approval of the high school superintendent, schedules the allotment. The high school principals were not instructed how to implement the budget cuts. Each school was simply allocated fewer staff units. The allocation of resources within a school requires decisions in three major areas: staff composition; use of teacher time; and the instructional program.

Converting staff units into positions involves deciding how many of each type of position there will be. Using a list of titles and weighted unit values (teachers = 1.0, assistant principals = 1.34, etc.), the principals convert their assigned number of staff units into the positions they want. This schedule becomes the personal service budget. In addition, to teachers, the schools have an administrative and support staff that includes a principal, assistant principals, guidance counselors, lab specialists, librarians, secretaries, and a few other miscellaneous positions. All together these positions accounted for only about 15 percent of the total positions in the pre-crisis period.

Each teacher (with a few exceptions) has a teaching assignment of twenty-five periods per week. Most of this time is spent in the classroom, but some may be spent performing certain other functions: guidance, organization and administration, or department supervison (see Table 7). Without changing staff composition, the amount of resources devoted to instruction can be changed by changing the use of teacher time.

In addition to the staffing and use of time decisions, the principal must also plan the instructional program. This involves deciding what courses will be offered and the class structure: how many classes per day each student will be allowed to take, and how large the classes will be.

APPENDIX B

HIGH SCHOOLS INCLUDED IN THE STUDY

ACADEMIC (69)

Benjamin Franklin
Charles E. Hughes
Seward Park
Haaren
John F. Kennedy
Washington Irving
George Washington
Louis D. Brandeis
Stuyvesant
Julia Richman
Music and Art
Morris
Herbert H. Lehman
William H. Taft
Christopher Columbus
James Monroe
Evander Childs
Walton
Theodore Roosevelt
DeWitt Clinton
Bronx Science
Adlai Stevenson
Lafayette
Midwood
Abraham Lincoln
Samuel J. Tilden
Franklin K. Lane
James Madison
Brooklyn Tech
Thomas Jefferson
Prospect Heights
New Utrecht
Boys and Girls
John Jay
Erasmus Hall
George W. Wingate
Eastern District
Bushwick
Bay Ridge
Fort Hamilton
Sheepshead Bay
Canarsie
Franklin D. Roosevelt
John Dewey
South Shore
August Martin
Benjamin N. Cardozo
Springfield Gardens
John Bowne
Francis Lewis
Martin Van Buren
Forest Hills
William C. Bryant
Long Island City
Newtown
Flushing
Far Rockaway
Jamaica
Richmond Hill
John Adams
Grover Cleveland
Andrew Jackson
Bayside
Hillcrest
New Dorp
Port Richmond
Curtis
Tottenville
Susan E. Wagner

VOCATIONAL (25)

Fashion Industries
Chelsea
Norman Thomas
N.Y. Printing
Art and Design
Food Trades and Maritime
Manhattan
Mabel D. Bacon
Alfred E. Smith
Jane Adams
Samuel Gompers
Grace Dodge
Clara Barton
George Westinghouse
Automotive Trades
East New York
William E. Grady
Alexander Hamilton
Eli Whitney
Sarah J. Hale
William H. Maxwell
Queens
Aviation
Thomas Edison
Ralph McKee

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